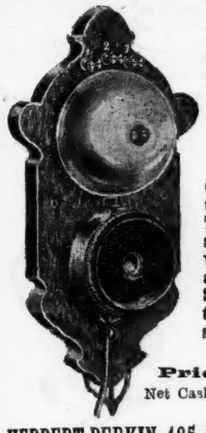
THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXXIV. No. 1894.] LONDON, AUGUST 29, 1899. [51ST YEAR. PRICE 6d.

STENTOR TELEPHONES.



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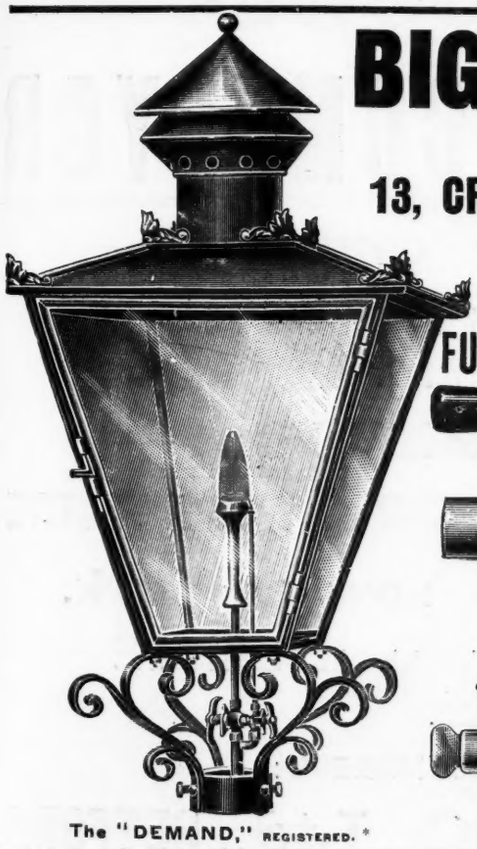

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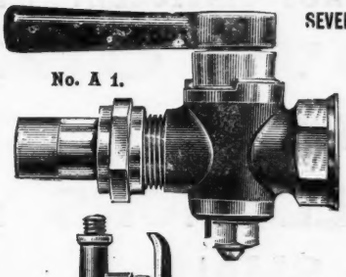

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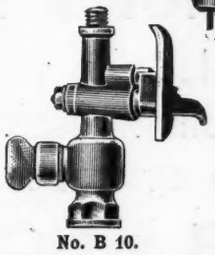

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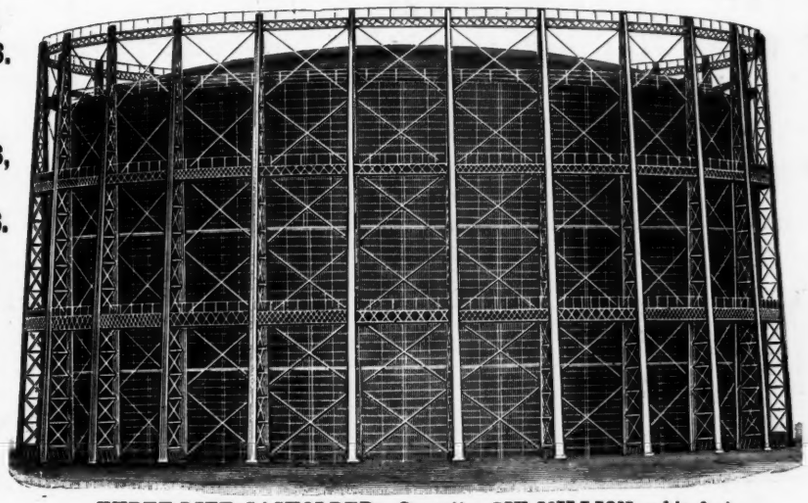

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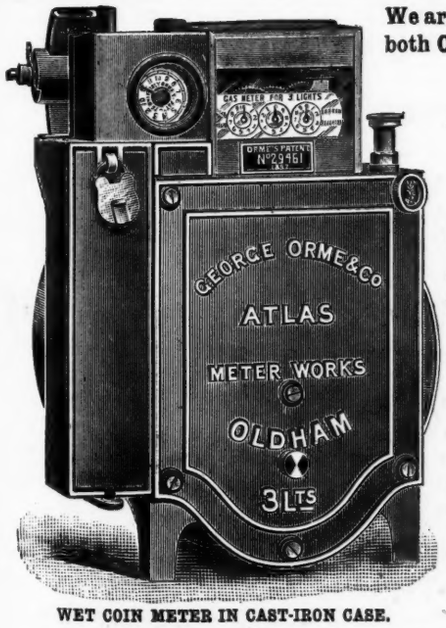

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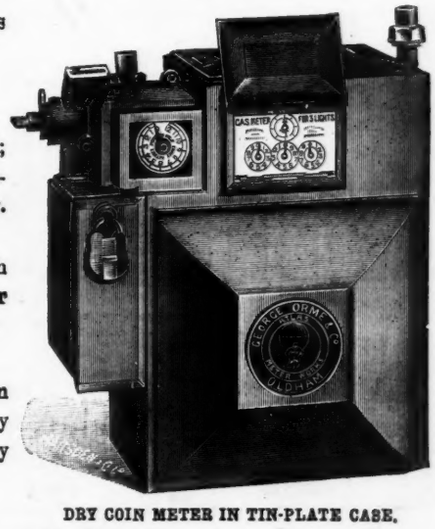

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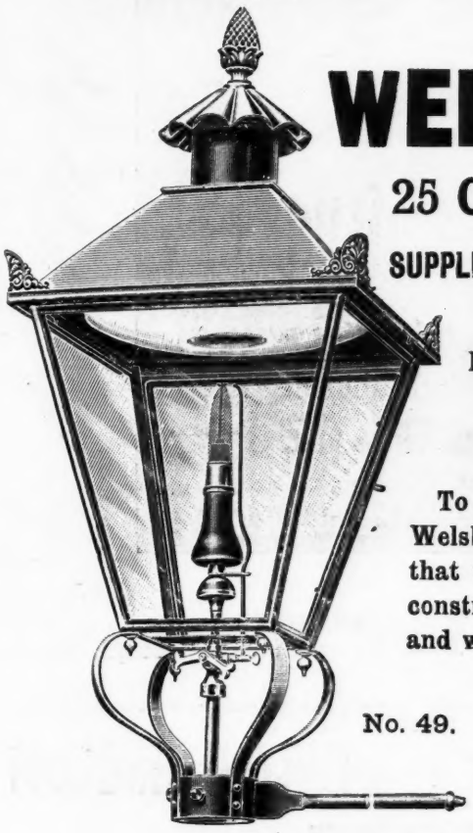

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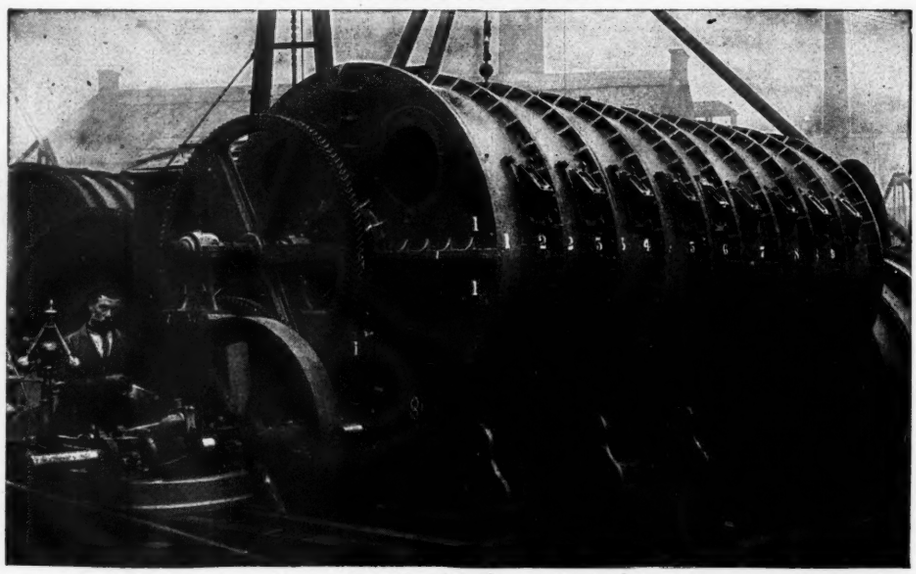

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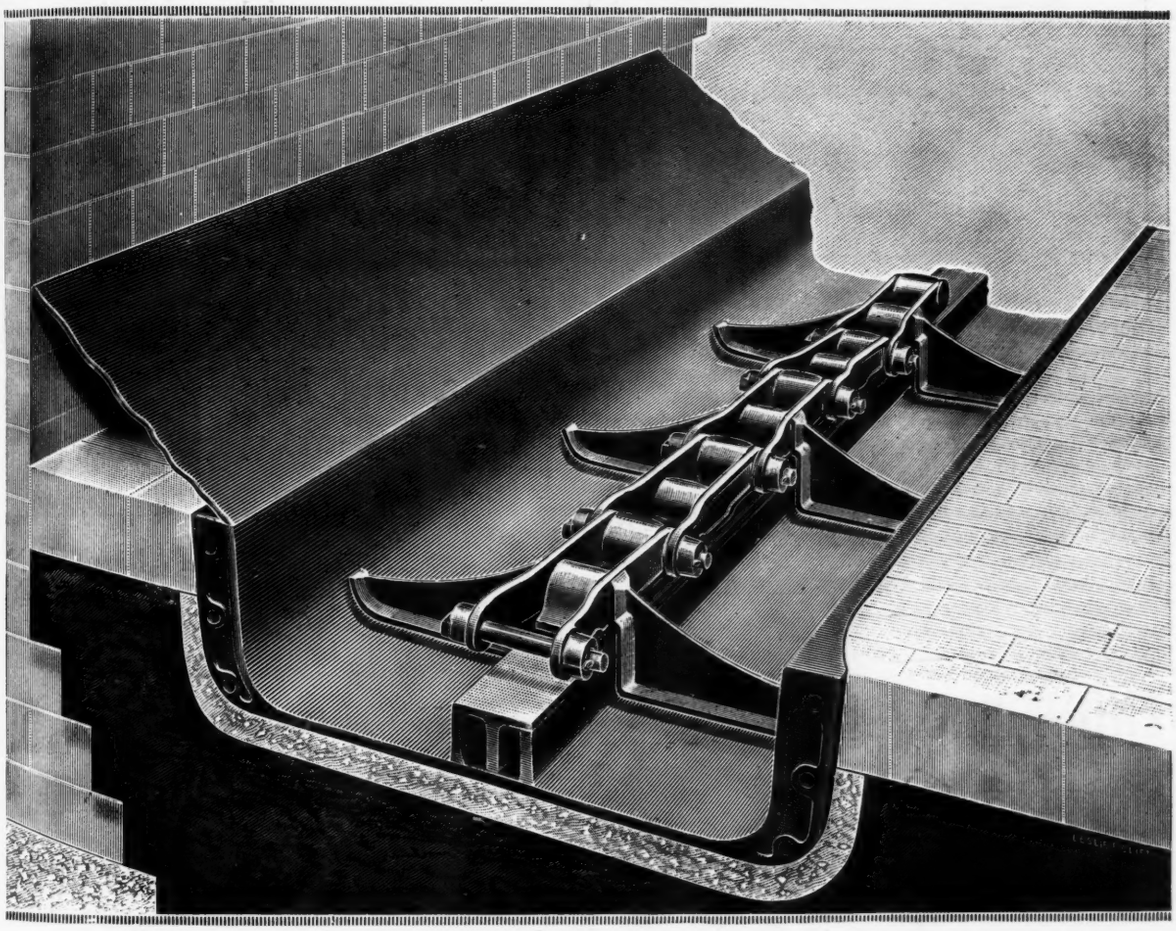

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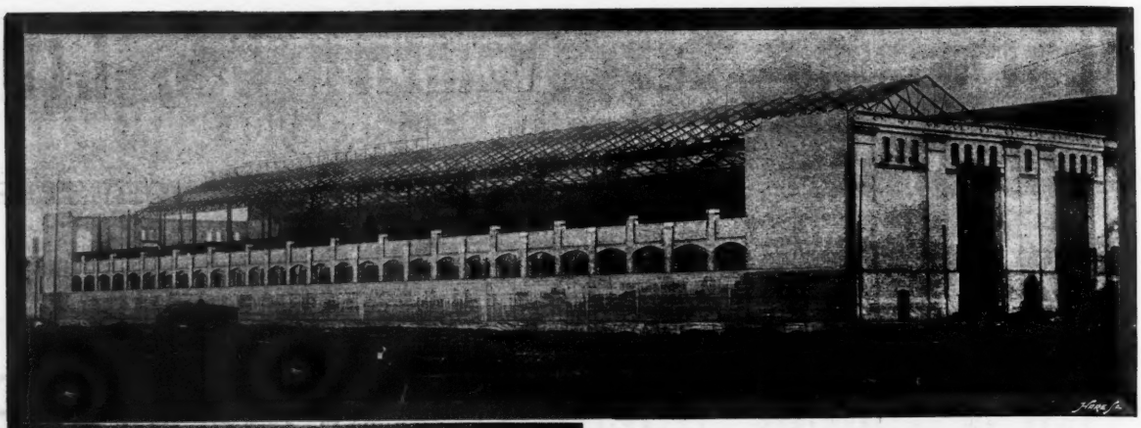
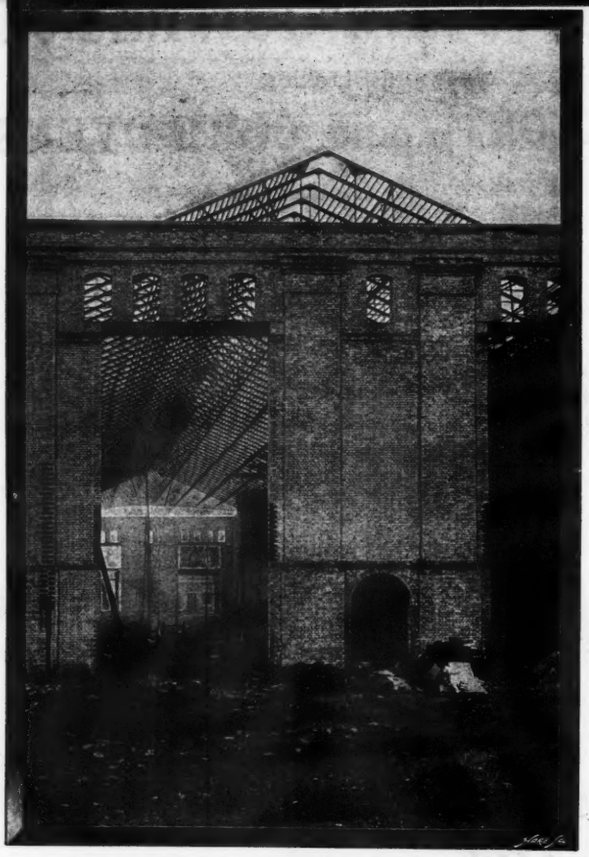
CATALOGUES AND PAMPHLETS ON APPLICATION.





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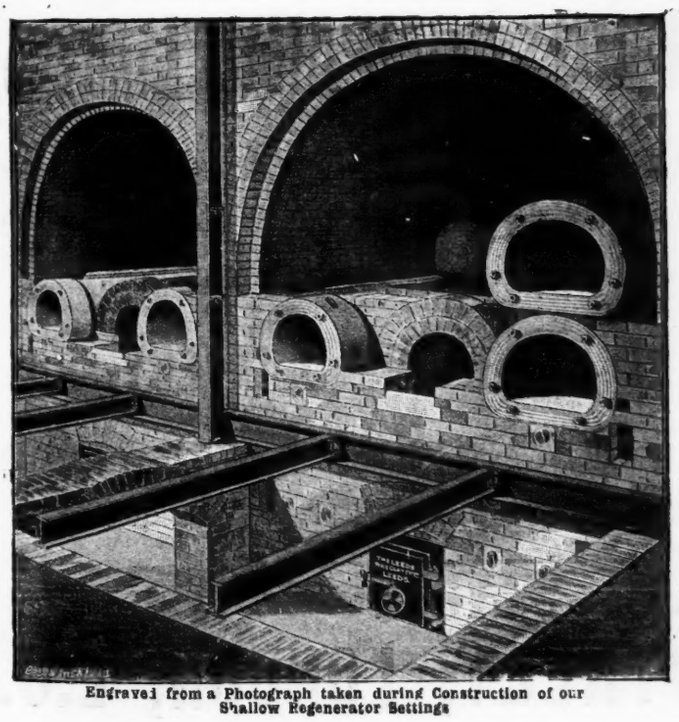

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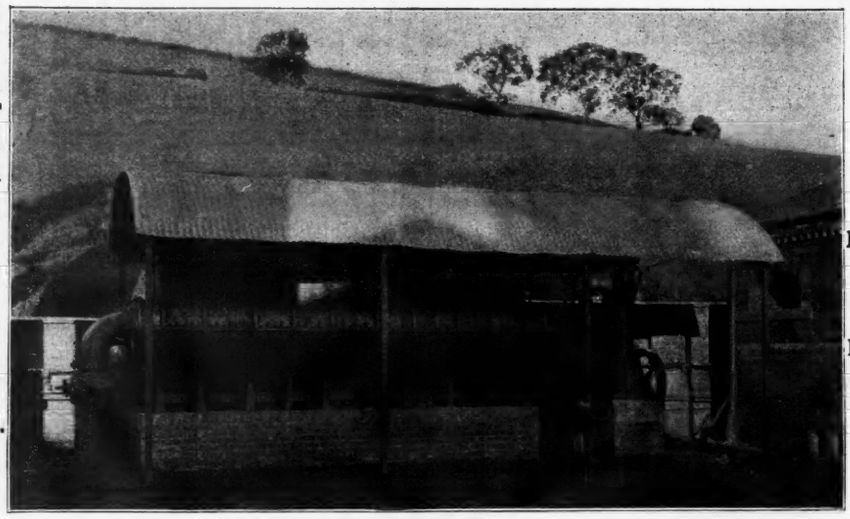

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Syracuse, N.Y.	850,000	The Gaslight and Coke Co., Beckton	2,250,000
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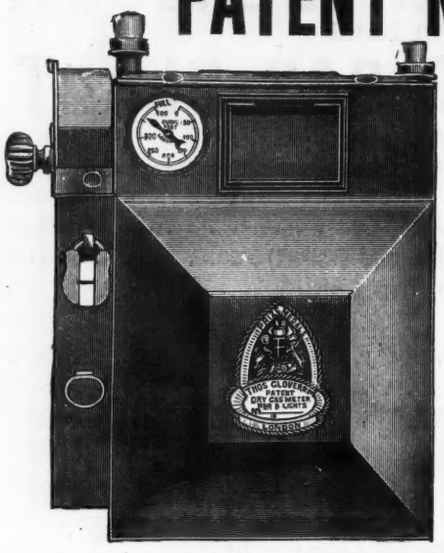

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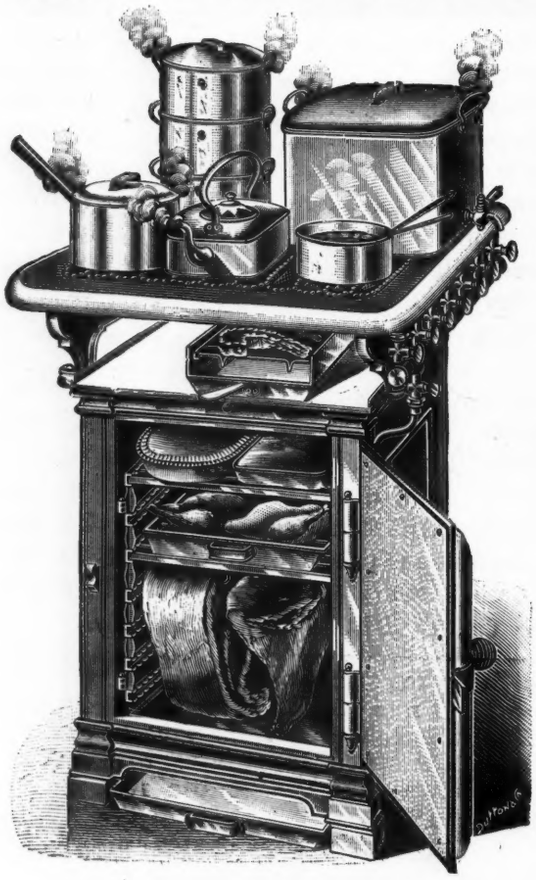

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EDITORIAL NOTES.

Cheap Gas and Dear Coal.

THAT outsiders have a curious inability in grasping the principles of the business of gas supply, is an old observation; but examples in proof are continually offering themselves. Only the other day, a financial newspaper distinguished itself by publishing an article of almost startling ineptitude on the subject of the gas and house coal consumption of London, in which the policy of the South Metropolitan Gas Company was credited with being inspired by a lively desire to counteract the designs of the Coal Trust! It is to be feared that the South Metropolitan Directors have no more artful principles than that of wishing to make the best of the situation in which their undertaking is placed. The newspaper which so highly appreciates their imagined superior cleverness starts from the fact that house coal is dear this year. This is incontrovertible; and those who know something of the matter incline to the belief that coal prices are not likely to be low again within an early period, if ever. The explanation offered is that the greatly increased price is chiefly due to the action of the leading London coal merchants, who are said to have formed a Trust whereby they can control the market. These nefarious plotters are blamed for rigging the house coal market; and one result of their combination is asserted to be the transference to their own pockets of the amount of the duty of 13d. per ton formerly levied on all coal brought into the port of London. "This abolition "was, of course, intended to benefit the consumers, and "we fancy that even the most ardent Free Traders would "have hesitated to aid in bringing it about, could they "have foreseen that within eleven years a group of "merchants would unite and secure to themselves the "whole benefit of the remission of the duty."

This is the kind of illustrated argument that the believers in the fast-dying superstition of indirect taxation always use. It is hopelessly vitiated by the glaring fact which always stares one in the face, that "rings" and "trusts" are rankest where indirect taxation or protective duties are highest. Those who use it are blind to the first principle of Free Trade, which is that no extraneous, artificial burdens whatever can be laid upon trade without hampering it, and making the consumer pay more than a correspondingly enhanced price for the article taxed. Market values originate independently of fiscal arrangements. Coal is bought at the pit's mouth for what it is worth, which consideration is not affected by the destination of the cargo. He would be a bold man who would argue that it is a matter of equal indifference to the ultimate consumer—say, at Hastings—that there is a local duty of half-a-crown a ton upon the commodity. If the London coal merchants are responsible for the dearness of house coal in the Metropolis, how is it that the London Gas Companies have had to pay something like 2s. per ton more for their coal during the past two years? The Companies do not buy of the house coal merchants.

The latter circumstance is ignored by the journalistic critic of coal and gas prices, because he sees that the South Metropolitan Company are able to reduce the price of gas. He fancies that the Company have done this, as it were spasmodically, because the Directors "foresaw "that the Coal Trust, in its efforts to make abnormal "profits, would force the price of coal up to such a point "that people would begin to ask themselves whether it "would not be cheaper to heat their rooms with gas." It is an ingenious supposition, but, we fear, wide of the mark. Gas is utilized for many other purposes than heating rooms, although it is in increasing demand for this use in common with others. It is quite true that dear coal will operate to direct public attention to the advantage of cheap gas; and so indirectly the wicked plans of the London Coal Trust, if it has any, will be frustrated by gas. But the motive of the South Metropolitan Company's reduction in price is nothing so incidental, or accidental, as this. It is merely the firm faith that trade in gas, as in every other commodity, is fostered by cheapening the price; and that the often-heard contention that gas at a certain figure is "cheap enough," is a pernicious fallacy harking back to the dark ages of Protection. The small cleverness that aims at "besting" one's trade rivals is not for a great statutory undertaking. Gas Directors will not be expected

to adjust their policy to the supposed need for checkmating Coal Trusts; but only to believe in cheap gas, and do their best to supply it.

Gas Poisoning and the Inspection of Fittings.

THERE has been a painful case of gas poisoning at Plymouth; a child sleeping in an upstairs room having been killed by inhaling gas that escaped from a defective fitting in the room beneath. This being the second fatality of the kind that has occurred in the town since the introduction of auxiliary carburetted water-gas plant by the Gas Company, much interest naturally attaches to the precise circumstances of the deplorable event. We report elsewhere the proceedings at the adjourned inquest, from which it will be seen that the Deputy Borough Coroner, Mr. J. Graves, and his Jury, exhibited a most praiseworthy degree of acumen in keeping to the point of the immediate cause of the accident, and declining to go off into general matters when they had before them ample evidence establishing the particular conclusion. Whatever the composition of the gas supplied, here was a case of a broken pipe liberating enough gas to serve three ordinary burners. The gas came up through the floor; and although the window was open, the mixture of gas and air was fatal to the sleeping child. These were the facts; and the sensible Foreman of the Jury declared that there was no need to go beyond them. How the pipe was broken did not transpire; but it came out in evidence that the plumber who eight weeks previously fixed the gas-pendant for the tenant did not take particular notice of the condition of the old pipe connection. He assumed it was all right, and made a joint for the pendant. Complaints of a smell of gas immediately arose, and another man was sent by the master plumber to see to it. This man discovered a small leak, which was supposed to account for the smell of gas; but the more serious leak remained undetected. More than one attempt was made to ascertain the source of the continuing smell of gas; but, unhappily, the searchers were misled every time. At last the child died; and then the mischief came to light. The verdict of the Jury was "Accidental death," with an expression of opinion that gas-fitting work of the kind in question "should always be inspected, on comple-"tion, by the employer, or some responsible person." A most sensible finding! Men of a less businesslike or more sentimental nature might have been persuaded to extend their remarks to include the character of the gas supply; but these Plymouth jurymen hit the right nail on the head, and left the rest to public opinion.

Unquestionably, when a journeyman gas-fitter is sent to make a connection on the consumer's side of the meter, his employer or foreman should follow and satisfy himself that all has been left safe. This is the ordinary responsibility of a person who contracts with another to do certain things which belong to his calling. We do not wish to raise the question of negligence in connection with the Plymouth fatality; but anyone reading the report of the inquest can see who is the really responsible party. A tradesman who takes orders for work engages to do it properly, at his peril. The Gas Company had nothing to do with this case, any more than would the Water Committee of the Plymouth Corporation with an analogous case of a careless bit of internal plumbing resulting in the flooding of a house. Such instances, however, are sure to strengthen the plea for making the suppliers of gas responsible for what goes on beyond the consumer's meter. It is difficult to say in what degree this responsibility actually exists; but if a slight extension of it is the price of the acceptance of the duty of inspecting consumers' fittings on the part of the undertaking, we do not doubt that the price would be cheerfully paid by the majority. It is so vastly to the interest of the gas industry, to say nothing of the higher claims of the public safety, that such fatalities as that at Plymouth should not occur, that almost anything would be undergone to prevent them. This is a subject of great and apparently growing importance, and as such it is to be hoped that Gas Companies and Committees will carefully consider the position.

One minor, but yet important, point arising in connection with the Plymouth case deserves attention. It is the old question of the prudence, or the reverse, of shutting off the gas from a house every night at the meter. This is a proceeding which careful householders greatly affect, and indeed pride themselves upon; but it has never been regarded in the same light by expert opinion. In his charge to the Jury, the Plymouth Coroner said: "Fortunately, "the gas was turned off there [at the meter] every night, "or the whole of the occupants of the house might have "lost their lives." The greater probability is that if this had not been done, the intolerable smell of gas, not only at night but all day long, would have ensured prompt attention to the leakage. Again, incandescent burners, with bye-passes, were in use in this house; and a bye-pass where gas is always being turned on and off is a nuisance as well as a danger. In the case in point, the bye-passes were admitted to have misled the searchers for the leak. For these and other reasons that might be given, it is our conviction that the practice of shutting off the gas nightly at the consumer's meter is dangerous, and in this instance probably contributed to the disaster. This opinion will be supported by the general consensus of skilled judgment. Lastly, it is to be hoped the ironmongers' and plumbers' trade journals will give prominence to the fatality, which five minutes' use of a pocket pressure-gauge by a foreman gas fitter would have prevented.

The Gas Supply of Liverpool—A Reduction of Price.

THE Liverpool United Gaslight Company have had a prosperous year, and have signalized the fact by reducing the price of gas to 2s. 8d. per 1000 cubic feet as from the commencement of the current quarter. It will not be overlooked that this is not an effect of the sliding-scale, which does not apply to Liverpool, while it is rendered possible by a substantial increase of consumption, notwithstanding the active competition of municipal electric lighting. In despite of fine warm weather, electric light, and a flood of prejudiced abuse of the character of the supply, Liverpool last year took more gas than ever before; and now the price of this gas is the lowest ever reached. Sir Edward Lawrence, the Chairman of the Company, is justified in claiming credit for the businesslike conduct of the undertaking which has resulted in so splendid a record. The local public must be feeling slightly ashamed of the reckless vilification to which the Company have been subjected, first on one account and then on another. Liverpool has given up the desire to municipalize the gas supply, having its municipal hands pretty full of other matters just now. There is also among the leading citizens a healthy belief in the virtue of private enterprise in matters of business; and so long as local magnates of the stamp of Sir Edward Lawrence continue to take the places due to their standing in local affairs, so long will the citizens be well served. It is from men of little or no experience in business, as a rule, that proposals for extensive schemes of municipalization come. Men who have jumped into a Town Council from the agitator's platform, or busybodies who take up with local politics because they have nothing else to do, are more easily led to believe that Municipalism can do everything than are merchants, manufacturers, and traders, who know from experience how much easier it is to lose money than to make it. They are, besides, better judges as to managing men, and are holders of responsible positions generally; and when their affairs are in good hands, they are therewith content. Liverpool is fortunate in having a call upon the services of some of the most capable men in any community. The city passed through a troubled time some years ago, when men of a different stamp came to the front of political and administrative affairs. But the strong current of local public life has purified itself again, as it always will do where all classes are willing to participate in it.

A Trade Union Split.

AN ancient proverb tells us what we may expect as the normal result of allowing rope enough to an individual otherwise worthy of a halter. He will hang himself sooner or later. So it appears to be with militant Trade Unionism—its tyrannical spirit will bring it into trouble and loss, even though no "bloated capitalist" may have sworn to "smash the Union." A very pretty quarrel has broken out between the Amalgamated Society of Engineers and the Parliamentary Committee of the Trade Union Congress, the end of which is not yet in sight, but which meanwhile supplies a basketful of "morals" for those students of Trade Unionism in action who will take the pains to pick them out. It is hardly necessary to say, although newspapers and politicians generally ignore the truth, that there is a vast difference between the theory of Trade Unionism as it is expounded in books and magazine articles, and

the practice of the thing as experienced in Society-ridden workshops. Theoretical Trade Unionism is a beautiful dream; practical Trade Unionism is a sordid, grinding tyranny, the benefits of which to its willing slaves are as nothing to the price paid for them. When Trade Unionism clashes with the interest of employers, or with the ordinary rule of law, order, and fairplay as between man and man, plenty of apologists are found for it. The real fun begins when one Trade Union gets to loggerheads with another. Then the whole tribe of popular newspapers, would-be conciliators, and the rest, are dumb. The case in point contains difficulties enough to confound the most convinced believer in Trade Unionism as an agent of peace in the world of organized industry.

The Amalgamated Society of Engineers have been suspended from the Trade Union Congress for two years, for a breach of the congress rules. Seeing that the congress is one of the few successful examples of the agreement of Trade Unions to act together, this exclusion of the A.S.E. is a sad "rift within the lute." It has come about in a strictly logical way, through certain members of the A.S.E. having taken the place of some members of the Society of Co-operative Smiths actually on strike. The congress rules provide that when two Societies are at variance, the dispute shall be submitted to a court of arbitration constituted by a Committee of the Parliamentary Committee. This procedure was followed in the present instance, with the result that the arbitrators found the A.S.E. guilty of breaking the rules, which entailed the penalty of exclusion from the congress. Nothing could be more regular; but the executive of the A.S.E. have imparted a little zest to the affair by publishing the details of the original dispute, which makes the formal finding look particularly foolish. To the dreadful accusation of having acted as "blacklegs" in a Tyneside shop, the heads of the A.S.E. reply that at the time they had no knowledge of any strike, and that now, with all the facts before them, they hold the so-called strike to have been absolutely unjustified. The trouble arose over the employment of a young deaf and dumb "striker" at a smith's fire, which promotion gave dire offence to two members of the Society of Co-operative Smiths, who accordingly left their employment. Their places were taken by two members of the A.S.E., who had no objection to working beside the young aspirant. The high and mighty Parliamentary Committee of the Trade Union Congress declared that they had nothing to do with the merits of the case. It was sufficient for them that one of the sacred canons of official Trade Unionism had been broken by the A.S.E.; and accordingly the official *anathema* must go forth against the offenders. To this Mr. Barnes, the Secretary of the A.S.E., very promptly replies that if this sort of thing is Trade Unionism, his Society do not wish to be identified with it. By refusing to consider the merits of the so-called strike of two men against one boy, the Parliamentary Committee of the Trade Union Congress have made the organization the slave of the letter of the rules; and this, as Mr. Barnes remarks, places the affair at the mercy of "any handful of feather-headed fanatics anywhere." This kind of folly is bound to work its own ruin in time.

WATER AND SANITARY AFFAIRS.

Up to the end of last week, the long continuity of dry weather which has characterized the present remarkable summer had not been broken, though rain has fallen since. The extent to which its absence has affected the country, as far as water-supply undertakings are concerned, was shown in the particulars given in the "Journal" last week; and others will be found elsewhere to-day. They may be left to tell their own story, without comment. Corporations and Companies alike are passing through a trying time; and those whose works have permitted of the greatest storage of water in the past are now realizing the benefits of this provision. The Barnet District Gas and Water Company, as will be seen by the report of their half-yearly meeting which appears on another page, have been suffering from various causes—the prevailing drought being a very prominent one; and the Chairman—Mr. James Glaisher—in the course of his address, explained to the shareholders that, comparing the rainfall for the past three months with the Greenwich records, which extend over 84 years, we have not had half the proper quantity. Fortunately, the supply of water in the Metropolis has been kept up, thanks to the intercommunication arrangements, although, judging from the eagerness with which unfounded reports as to a failure have been put in circulation, there has apparently been a wish in certain quarters that such an eventuality might ensue. The 22nd of August last year was a fateful day in the history of the East London Water Company, for it was then that the curtailment of their supply commenced. The middle of the present month, therefore, has come to be regarded by the Company's detractors very much as the Ides of March were by the enemies of the Roman Emperor. Accordingly, a report was circulated by one evening paper last week, and promptly repeated, that the Company would shortly issue notices of a reduction in the supply by four hours daily; and another said that if it was found that this curtailment was insufficient, further measures would have to be taken. Last Saturday, the paper responsible for the latter statement went so far as to assert that an "official" had explained that if it had not been for the "wholesale "and wilful waste" by many of the Company's customers who have gardens, the supply would have held out till the end of next month, even supposing no rain should come in the interval. We do not know who the "official" in question may have been, but the Secretary of the Company —Mr. I. A. Crookenden—who may well be supposed to know something about the Company's proceedings, has promptly given an unqualified denial to the statement. He says that no decision has been come to by the Directors on this matter; for they trust that, with ordinary care on the part of the consumers in preventing waste and misuse of water, no curtailment of the constant service need be resorted to. Some weeks ago the Company made what a writer in a Bradford paper lately called a "moral appeal" to the consumers on this matter. As it does not appear to have had much effect, they are following it up by a little of the "gentle compulsion" which he recommended. In other words, their legal advisers have applied to various Police Magistrates for summonses against certain consumers whom they have reason to suspect of being guilty of wasting water. Possibly the infliction of a few fines on these parties will serve to encourage the others.

Turning to the Provinces, Bradford is suffering very keenly from the prolonged dry weather. Last year, about the beginning of August, the supply of water had to be shut off at night; and, as recorded last week, a similar measure of precaution has had to be resorted to now. The present trouble arises in a large measure from the nature of the manufacturing operations carried on in the city. Owing to the drought, the ordinary sources of water available for the wool-combers have run absolutely dry; and the result has been that they have made inordinate demands upon the municipal service. The extent to which this is being drawn upon will be appreciated when it is mentioned that last Wednesday, notwithstanding the restriction of the domestic supply, the total consumption was no less than 15½ million gallons, which is considerably above the normal consumption when water is plentiful, and is freely used for street and garden watering. It is not difficult to see the reason of this when it is stated that six firms only, out of the thousands supplied, took an average of 3 million gallons that day; and the total consumption on Friday was 12¼ million gallons. As pointed out by the local paper from which the foregoing figures have been taken, the continuance of such demands as these will give rise to grave anxieties; for the total quantity of water which can be brought to the city through the old works and the new conduit which has recently been specially connected is only 9½ million gallons per day. Happily, there is no danger of an absolute famine, for the available supply is sufficient, if equally divided, to give 30 gallons a head to all the population of the city, and 12 gallons a head in the out-districts. In an ordinary residential town, this would be ample for all requirements; but in Bradford, the normal trade consumption is 20 gallons per head per day. Last week witnessed an enormous consumption of water in Manchester—exceeding on two days 40½ million gallons, as compared with a daily average of 35 millions in ordinary times. The stock of water has been reduced to 64 days' supply. Great anxiety is being felt at Lancaster, where the service is becoming more inadequate every day; and, to make matters worse, Morecambe has to be provided with a certain quantity daily.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 550.)

Business on the Stock Exchange last week was at a low ebb; and it would probably have been much lower if the political outlook had been more pacific. The holiday season is in full swing; and year by year vacations seem to intensify, and business is more and more suspended, or at least interrupted. The intense heat also indisposed those who had to be in London to be energetic. Transvaal affairs still continued the chief factor; and the general tone was rather sensitive. Movements were of small dimensions, however, though mostly in the downward direction; and flatness ruled at the close. Consols showed the feeling by a marked fall. The Money Market did not evince any particular tendency, and was hardly changed. In the Gas Market, transactions were extremely light and unimportant, it being almost a period of inanition. Only one variation in quotation was effected; and this, being of a preference issue, was of no importance, and afforded no indication of any general tendency. Nearly all the leading Companies have issued their reports and accounts, and have held their meetings. The net result is to show that the first half of 1899 has been a favourable period for gas companies in general. More or less considerable increases (rising to big figures in the suburbs) are apparent in the actual sales of gas, despite competition; and the revenues have been materially aided by the good prices ruling for residual products. Of the Metropolitan Companies last week, a very moderate amount of business was done in Gaslight ordinary at steady figures, opening and closing at about 108. The preference was more freely offered, and the price fell a point. South Metropolitan was rather more active, but showed no disposition to go higher. Commercials were quiet and unchanged. Nothing at all was done in any of the Suburban and Provincial undertakings. Only two or three bargains saved the Continental Companies from complete stagnation; and the like may be said of all the rest in the remoter world. Business in the Water Companies was very quiet, and quite devoid of interest beyond the fact that the general tendency was firm.

The operations of the week may be summed up in a few words. On Wednesday, Gaslight preference receded 1. In Water, Southwark ordinary rose 1; and on Friday, 1 more.

ELECTRIC LIGHTING MEMORANDA.

The Electric Lighting of Penzance—A Good Example of Estimating—The Correct Rule.

At last the truth has been faced, investigated, published, and allowed for in an estimate of the financial prospects of municipal electric lighting. There was a short paragraph in our last week's "Electric Lighting Notes," relating to the proposed application of the Corporation of Penzance for an Electric Lighting Order, which marks the dawn of a fresh intelligence in this regard for the local authorities of those smaller towns which have not yet gone in for the luxury of municipal electric lighting. Penzance, like many other places, has been playing for months round the question of the expediency of applying for a Provisional Order. It is unnecessary at this time of day to enumerate and discuss the *pros* and *cons* of such a question as it is presented to any municipality. Unfortunately for the ratepayers of many a locality, their representatives have seldom been left to deal with it on its merits; but the decision has been forced on by the interference of some general electrical speculation company, on the principle "if you do not apply for an Order, we shall." Hence many a district utterly unsuited for electric lighting at a profit, has been frightened into procuring an Order for itself. As we have often complained, the Board of Trade have been far too free in granting Electric Lighting Orders; this Department acting in this regard like the Patent Office, which will issue a so-called patent for any foolish thing, so long as the applicant conforms to the rules and pays the fee.

The experience of the much-burdened town of Teignmouth, South Devon, may serve as a warning to other Urban District Councils trembling on the verge of an application for an Electric Lighting Order. Teignmouth went for an Order, and obtained it; only to find that the costs mounted up to nearly £700 for the bare permission to incur greater indebtedness. This was a "staggerer;" and it justifies our frequent contention that the Electric Lighting Acts, with their appearance of favouring municipal enterprise in this very dubious direction, have cost the ratepayers of this country dear. But we are not really forgetting the case of Penzance, although we have broken off to mention Teignmouth. Penzance is blessed with an able and conscientious Borough Surveyor in Mr. F. Latham, who, on being instructed to look into the financial prospects of a town's electric lighting undertaking, tackled the matter in a way that we have often vainly advocated as being the only safe and pertinent procedure. He looked round for examples of electric lighting as she is actually done in towns nearest in population to Penzance. Nine times in ten, those who frame electric lighting schemes go by sheer guesswork, or pick out the most strikingly successful examples to form the basis of their expectations of the amount of business to be done. Mr. Latham was wiser. He obtained a number of data from places so dissimilar and widely separated as Altrincham, Bexhill, Harrogate, Morley, Taunton, and others; and concluded that Penzance must lose £2000 on the first year's electric lighting. The loss would be a decreasing one until the end of the fourth year, when it should amount in all to £4150. This is the estimated total of the adverse balances of the first four years' working. In order to provide for this loss, Mr. Latham suggests that it should be included in the amount to be borrowed, so that the burden may be spread over twenty years. After eight years, the undertaking should pay £1000 a year profit. It does not appear whether this estimate allows for depreciation; but such a careful engineering adviser would hardly ignore this consideration.

We have no hesitation in declaring this treatment of the case of Penzance to be the most masterly, candid, and worthy performance of the kind that has yet come under our notice. Many towns would have given much to have been guided in the same way at the commencement of their electric lighting ventures. Moreover, the method of financing the business suggested by Mr. Latham is strictly correct. The undertaking is for twenty years; and so long as the grand balance is on the right side at the end, this is all that is necessary to solvency. Besides, all the London Electric Light Companies at first charged part of their working expenses to capital—as is, indeed, customary in such circumstances. So far as our knowledge goes, however, this simple and fair expedient has never been practised by local authorities in regard to electric lighting; and the Treasury would have to be consulted about it. The immediate interest of Mr. Latham's method lies in its frank acceptance of the losing character of municipal electric lighting, not merely at the start, but for some considerable time afterwards. This recognition frees him from the possibility of such after-reproaches as many other towns might heap on their electrical advisers, if there were any comfort in crying over spilt milk. The difference of treatment in this case is partly due, no doubt, to the circumstance that the estimator is a corporation officer, not a touting electrician who does not care what the rates mount to so that he bags his order. The majority of the municipal electric lighting losses of the last decade are traceable to this blunder of taking advice from outsiders. At first, of course, there was the excuse that town surveyors had no competent knowledge of electric lighting matters; while the travelling gentleman with an address in Westminster, and an imposing tail of capital letters to his name, was able to talk about voltages and things until the simple town councillors were sufficiently impressed. Then the accomplished electrician would switch on the sentiment, and dilate upon the healthfulness of electric lighting, and the desirability of the boon for every community so advanced as that for which he had the honour to speak. So the trick was done in scores of cases. Now it is well understood that the electric lighting business, like every other, is amenable to the comparative method of estimating. There is no more mystery about it than there is about the cost of making a pier or an esplanade. You can frame your estimate of what is wanted, and then look around and see how the experience of others bears out your own expectation. Touting electricians have never done this; and the consequences of trusting in their interested fairy tales are exhibited on all sides. The man, with a competent professional equipment for the task, who will have to live in, and by, the town that he advises, must be a safer guide than the most eminent carpet-bagger.

DR. KENNEDY ON MECHANICAL TRACTION FOR THE LONDON TRAMWAYS.

Some mysteriousness has been attached to the report on mechanical tramway traction which Dr. A. B. W. Kennedy was commissioned to furnish for the guidance of the London County Council. It was known that the occasion which procured Dr. Kennedy this charge was of the first importance; and it was also understood that Dr. Kennedy fully appreciated the gravity of the responsibility laid upon him, and was taking his work very seriously. Early in June it was reported that the task was completed; but time passed, and the substance of Dr. Kennedy's advice was not permitted to transpire. Hence the rumour arose, and was industriously spread from some quarters, that the report itself was disappointing. In view of the magnitude of the interests at stake, and remembering Dr. Kennedy's ability and candour, we have resolutely refrained from noticing these disrespectful rumours until we had the text of the report before us. This advantage has now been afforded by the authoritative publication of the report; and it becomes our duty to take account of the tenour of this statement, regarded as the last word for the time being on a subject which we have already treated of at length.*

Dr. Kennedy's work begins where the painstaking amateur, Mr. J. Allen Baker, left off. Mr. Baker collected a great deal of evidence of what had been achieved in the way of mechanical tramway traction at home and abroad; but he had no mastery of engineering science to help him to judge his matter on its merits. As a compiler, however, Mr. Baker was excellent; and Dr. Kennedy, thanks to him, has been able to pass over the

* See "Journal," Vol. LXXII., pp. 968, 1086, 1214, 1348.

mere detailed description of systems which must otherwise have cumbered his report, and proceed straight to the main object of his studies. Those who complain that Dr. Kennedy's report is unduly curt, should remember that not description, but criticism, was what was expected of him. His report is therefore of the nature of a reasoned judgment of a Lord Justice of Appeal, upon evidence previously gathered and made public property.

Dr. Kennedy was directed to say what, in his opinion, is the best system or systems of mechanical traction for the Metropolitan tramways, excluding steam and cable traction. Observe—the question was as to the *best* system, not merely what would answer the purpose for a time. And the advice was to be adjusted to the circumstances of London traffic, which, as we have all along insisted, means the Elephant and Castle junction. Dr. Kennedy, very properly, has kept the Elephant and Castle in his eye, and has thought of the permanent, rather than the makeshift, solution of the problem. His first thought was directed to the self-contained mechanical driving of tramcars by gas or compressed air. Upon this expedient, his remarks are just, but somewhat severe. He highly appreciates the "real and great advantage" of a self-contained motor car, and thinks that this quality should outweigh smaller drawbacks "if the systems in question were in other respects sufficient and satisfactory." Unfortunately, neither gas nor compressed air is actually quite up to the standard of the hard Metropolitan service. "The cars to be used in London must be so large and heavy, and the power required in each so considerable, that the use of reciprocating engines (whether gas or compressed air) of sufficient power as motors, is accompanied by many difficulties. In fact, I do not think that really suitable engines for this particular purpose have yet been designed." Here speaks the best contemporary engineering opinion; and those who are interested in the advancement of gas or compressed air traction must be content to reckon with it. Dr. Kennedy has seen the gas-trams "on a small scale" running with considerable economy in the North of England; and he also saw air-trams, not working, in America. After all, as Dr. Kennedy is careful to point out, if at any time such advances should be made in the matter of gas or air engines as to render it advisable to reconsider this question, tramcars so propelled could be easily put upon the rails. The line of effort is thus clearly indicated for gas-engine makers. Will it be followed up to a successful issue?

The rejection of gas and air leaves Dr. Kennedy face to face with electric traction, with which he grapples in an independent and masterly fashion. He classifies the available methods into "ordinary overhead," "underground conduit or slot," "underground surface contact," and "battery" systems. The first is, of course, by far the most used. Its practical success is proved by ample experience; and it gives any reasonable amount of power and any required speed of traction. When carried out roughly, it is very much cheaper than any underground system, which naturally commends it to 10 per cent. companies, and to municipalities of small towns where the traffic is light. The powerful drawback is the overhead wires, which also cost nearly as much as underground cables when the work is done thoroughly well. Dr. Kennedy justly observes that he cannot but doubt whether any system of overhead wires "can really be regarded as likely to prove a permanent and final solution of the traction problem in a great city like London." But leaving aside this general question, he is quite certain that such a system is wholly out of the question for the crossings and street junctions, of which there are so many in the busy London streets. "If any private company asked permission from a Committee of the London County Council to erect at any one of a dozen junctions which are shown on the tramways map, such arrangement of poles, span wires, stays, guys, conductors, &c., as are necessary with an overhead system, and as are to be seen in certain cities, I feel certain that the proposal would be met by an absolute and unconditional negative. So far as my own opinion is concerned, I do not think it would be advisable, or even permissible, to use such a system in such places as I have mentioned." This is the language of common sense and seriousness.

Of course, after the difficulty of negotiating the crossings and junctions is provisionally disposed of by the dismissal of the overhead system, this system remains in possession of all its advantages for the straight lines radiating from these junctions into the outlying districts. Here the overhead system is at its best; and there is no engineering obstacle whatever in the way of combining the two systems—conduit for the inner portion, and overhead trolley for the outer radius. The only question is—and it is creditable to Dr. Kennedy that he insists so strongly upon this way of looking at the subject—whether such a combination is worth while. The underground conduit system costs no more for power and upkeep than does the overhead. It undoubtedly costs more to construct; but the difference is only one of degree, and of a degree that has never been fairly determined. Even an overhead system must, in this country, have underground feeders; and the poles must be sightly. If the distributing plant is put underground at once, the job is done for a permanence. There is absolutely no valid objection to a good underground system, carried out in all its details with regard to every public interest. A good deal has been made of the third or slot rail as an additional danger to street traffic; but where the slot is restricted to the width of ¾ inch, as with the new Edinburgh cable lines, bicyclists like to use the rail as the smoothest track in the street. A wide slot, as at Buda-Pesth, would doubtless be inadmissible; but it is not essential. Moreover—and this is a most important consideration—with a conduit system there is no risk of electrolytic action, as it uses insulated conductors throughout.

Dr. Kennedy dismisses the surface contact and battery systems of electric traction as unproved or unsuitable; and the conclusion of his report is that the underground conduit or slot system is that which the London County Council ought to adopt over all the central parts of their lines. How far the system should be carried towards the outer radius or lines, is a question of comparative outlay. The key to the whole matter is Dr. Kennedy's persistence in regarding any overhead system as a temporary, makeshift arrangement, even where admissible—which it certainly is not for the heart of tramway London. As might have been expected, this judgment has rendered a section of the electrical trade interest perfectly furious; but we are sorry to find so respectable a technical journal as the "Electrical Review" joining in the outcry against the "startling" conclusions of this report. And all upon the thin ground that "great municipalities, whose work is not one whit less useful than that of the County Council, have already embarked upon overhead wire schemes." What, in the name of all that is reasonable, has this consideration to do with the driving of electric trams past the Elephant and Castle? It is admitted that "crossings and street junctions on the trolley system do involve a little complication." The London County Council ought to have a scale model of one of these junctions constructed, and let the trolley people show what they would do with it.

Dr. Kennedy is also blamed, very unfairly, for not scheming off-hand a perfect underground conduit for London. That is a matter of detail. It is further pointed out that "the underground system has been only adopted where it has been made compulsory." Naturally, where a company are the owners of the line! All these objectors pass over the fact that New York is actually doing, on the top of an enormous amount of previously well-watered capital, just what Dr. Kennedy advises the London County Council to undertake with their fresh resources. What if a permanent, underground system does cost at first twice or thrice as much as a wholly unsuitable and temporary trolley-wire system? This is nothing to the need of London for the best of its kind. Besides, a municipality employing capital at 4 per cent., including redemption, look at the matter differently from a company wanting to earn 10 per cent. dividends at the earliest possible moment. Why the Electrical Press should raise such a pother over the higher cost of underground conduits, is a mystery. The money will not go to manufacturers of electrical plants; but if the system is free from objection when completed, extensions will be rapid and continuous.

So far as our judgment goes, Dr. Kennedy has thoroughly and amply discharged the duty laid on him, and put the London County Council in the way of applying mechanical traction to their tramways in the only style offered by contemporary science that is likely to be adequate to the needs of the service and creditable to the Metropolis.

PRESERVATIVE PAINTS FOR IRONWORK.

A VALUABLE report on a series of experiments with preservative paints has been published in the "Engineer." The experiments were designed with a view to determining which of the paints and pigments in everyday use in this country are the best for painting ironwork, with special reference to the preservation of the metal from corrosion and rusting under conditions of great severity. Ironwork constructors can never have too much reliable information of this kind. Iron structures are essentially perishable, and are never paid for until they are pulled down. They are only maintained in a serviceable condition by constant watchfulness and periodical preservative treatment. Moreover, the trade in preservative paints, and substances intended for the same use, is a large and highly developed one. It is, on the manufacturing side, a branch of chemical industry; and where the industrial chemist is, the adulterator is not far away. Consequently, the engineer who designs or has charge of iron structures must not only rely for the life of these works upon paint, but he is also under the necessity of satisfying himself as to the reliability of the paint he uses. The cost of engineers' paint and painting is considerable; and the combination of economy with efficiency in this regard is a problem upon which engineers are very often engaged.

Several components go to the making of a preservative paint. There are, first, the medium and the pigment; and to these indispensable elements are often added the drier, and the filling—the last being something to save the pigment or supplement it in giving body to the paint. Having regard to the large use that is made of substances of the last-named order—such as barytes or whiting—in the preparation of paints, the "Engineer" tests were also directed to ascertain the effect of such additions to preservative coatings for ironwork. They decidedly cheapen the paint; but there has been a vague belief that this cheapness is procured at the expense of quality. The experiments now in question involved the reputations of 49 different preparations of paint, made up as ordinarily used without special treatment in any way. The pigments and body substances were ground with

the oil between rollers, in proportions to give a stiff paste, which was thinned to the proper consistency for painting with genuine well-boiled linseed oil, capable of drying in seven hours under ordinary conditions of temperature and exposure to air. Several grades of the same colour paint were made up, starting with the pure pigment and oil, down to the same with a heavy addition of some filling material, chiefly barytes. In addition to the paints proper, tests were also made with barytes alone ground in oil; and with linseed oil alone. The test was as follows: Three sets of 51 iron plates were painted; and after allowing sufficient time for drying, were given a second coat. When this was also dry and hard, one set of the painted plates was placed out of doors and exposed to the weather. These after eleven months were all in fairly good condition, with the exception of the plate treated with linseed oil alone, which was much corroded.

The two other sets were treated differently, the results of one set being taken to corroborate those of the other. There was no discrepancy, however; the results being practically identical in each case. Each painted iron strip was placed in a clean wide-mouthed glass bottle half filled with clean, pure water. The bottles were not closed, but were placed side by side on a shelf in the laboratory immediately under the table. The mouths of the bottles did not quite touch the underside of the table; so that, although there was free access of air to the painted plates, dust was kept out. The bottles remained untouched for three months. After about a week some of the plates had begun to corrode, which was shown at first by a cloudiness in the water, afterwards becoming a deposit of red rust. At the end of the three months the plates were taken out of the bottles, and the remaining contents assayed for iron in the form of rust. The result was taken as showing the amount of corrosion; but it is actually lower than the real amount, as no account was taken of the rust adhering to the iron plate. The weight of rust was calculated out to pounds per 1500 square feet of painted surface.

The detailed results are printed in two long columns in the "Engineer" for the 14th ult., which are instructive for those who have large quantities of paint to make up. We shall content ourselves with summarizing the broad results in the order of preservative efficiency. There was no rusting at all with the red-lead paint, whether used pure or let down by the addition of thrice its weight of barytes. Orange lead paint was equally good, and so were "vermilionette" and "permanent red" paints—the latter terms being trade names for lead brightened up by precipitated aniline dyes. Zinc white paints come next, which gasholder painters will be glad to know. White lead followed with the first weighable amount of rust; the figure being 75 to 81 lbs. of rust per 1500 square feet of painting. Pale iron oxide paint was as good as the white lead. The figure for deep oxide paint was 123, for middle oxide 134, and for bright oxide 137. Plain barytes paint was about as good as the oxides. The figure for pure graphite paint was 215. The black paints were not so good.

It is well remarked that these results testify to the immense superiority possessed by paints containing red lead or orange lead over most of the other common pigments, in the case of iron surfaces partly immersed in water. The paint composed of barytes and oil takes a far higher position in the list than many people would suspect, and shows that this material is not so much of an adulterant as it has been classified. Indeed, when added to some pigments of low efficiency in themselves, the barytes is a distinct improvement. Where the pigment is of high protective value, as in the cases of red lead, zinc white, and white lead, the addition of barytes is not to be recommended. On the other hand, it does not seem to be detrimental. A serious drawback to the use of red-lead paints is the tendency of the paint to solidify, so that the paint must be used soon after it is mixed. This hardening is due to the formation of a compound of the lead with the linoleic acid of the oil. The colour of red lead is also very harsh. It is suggested that the first coat might be of red lead, to be followed with one of the iron oxide paints, which form a good tough film when dry, and would well protect the first coat from abrasions.

A further series of experiments with the same paints was the painting of the inside of a number of round iron trays, 5 inches across and $\frac{1}{2}$ inch deep. After two coats, perfectly dried, the trays were filled with water which was allowed to evaporate, when the trays were filled again. This happened six times during the three months, when the trays were all examined. In most cases all trace of paint had disappeared, and a thick coating of rust covered the bottom of the tray; but all those painted with a red-lead paint were practically unaffected. The zinc whites, "lithopone," and white-lead paints were slightly rust stained. The results of this experiment were very much the same as those with the bottles, although the conditions were so widely different. It is to be gathered from these tests that a cheap red-lead paint, composed of 22 parts of red lead, 66 parts of barytes, and 12 parts of raw linseed oil, thinned with boiled oil, is as good as anything for preserving iron. A paste with 88·88 per cent. of pure red lead, and 11·12 per cent. of oil was no better. The iron did not rust in either case, so there is nothing to be said against the barytes. Only, if all this barytes is to be added, the engineer had better procure the ingredients separately and grind them to order, which will save buying the barytes at the price of lead. Barytes (barium sulphate) is quoted at from 45s. to 65s. per ton, or about one-sixth the price of the lead.

The rehabilitation of barytes as a paint body is one of the most valuable points of the "Engineer" experiments. The fact that this heavy body is not at all a bad paint-stuff was well known to engineers; but it has also been known to be difficult to work by itself. This consideration does not come out in regard to such a line of experiment; but the truth is that barium is so heavy that it gives great trouble in laying on iron uniformly. There is no advantage in adding barytes to an oxide paint. One of the best qualities of the latter is the stoutness and toughness of the film it helps to form. There is nothing like it in this respect. It cannot be denied, however, that the world at large is growing tired of the colour of oxide paint. In towns especially, pressure is being put upon engineers to paint some other colour large iron structures much exposed to view. There are, of course, different shades of iron-oxide paint; but they all belong to the same hard-featured family. Consequently a good deal of fancy tinting is nowadays employed on ironwork; various shades of green being very popular. This tendency to emancipate iron structures from the tyranny of crude red, to say nothing of tar, is laudable enough and is to be encouraged; for few iron structures can be said to look better unadorned than when suitably coloured. It behoves the engineer to be careful, however, lest his well-selected finishing paint proves perishable. Besides the failure of such a paint to serve the prime purpose for which it was applied, nothing looks worse than a coat of paint in a state of decadence. We fear that the results tabulated by our contemporary will tend to make engineers shy of pretty tones of green and umber. There is something more to be said about the advantages of barytes in this connection. A good deal probably depends also upon the relative proportions of pigment or body and oil. Boiled oil alone stands condemned as very perishable. When once it begins to go, probably it does more harm than good to the iron in contact with it. It seems obvious, therefore, that a paint with a high proportion of oil in it—and some samples run up to 40 per cent.—must be altogether a different thing from a paint with the more usual proportion of 10 or 12 per cent. of oil.

These considerations indicate that there is still much to be learnt about the behaviour and the mutual reactions of paint components and the iron or steel to which they are applied. Meanwhile, it is satisfactory to have so much exact information on the subject as the account of these experiments contains.

RECENT PUBLICATIONS.

Saunders's Law of Negligence. (Butterworth and Co.)

The question of the liability attaching to negligent acts of omission or commission is one which concerns everyone, but more especially those who are employers of labour, and whose business brings them, their plant, or their agents, into frequent relations with the outside public. The managers of gas undertakings should therefore, obviously, have a full knowledge of the law relating to such liability. Although the work under notice is primarily intended for practitioners, its lucidity and fulness render it thoroughly intelligible and valuable to those whose duty it is to avoid incurring, rather than to contest claims for, damages inflicted by acts of negligence.

This, which is the second, edition of the work of the late Recorder of Bath, has been rewritten by Mr. E. Blackwood Wright, and the chapter on employers' liability now includes a comprehensive account of the Employers' Liability Act of 1880 and of the Workmen's Compensation Act of 1897, both of which measures have been added to the statute-book since the original work of Mr. Saunders was published. The whole basis of the first of these Acts is negligence. In regard to the second, Mr. Wright remarks that he has included it because in many cases of negligence it affords an alternative remedy. We are thankful that, for any reason, it has been so included, for the arrangement by which the parts of the many Acts referred to and embodied in the Workmen's Compensation Act have been collected and intercalated with the text of the Act itself is useful.

The work, of course, only deals with actionable negligence, which is by no means necessarily the same as negligence in the popular sense of the word—that is, carelessness or thoughtlessness which, even though it cause damage, does not of necessity entail liability at law. Actionable negligence is defined as that which involves such a breach of some duty to take care, imposed by law, as shall directly result in injury. In the words of Lord Esher, it "consists in the neglect of the use of ordinary care or skill towards a person to whom the defendant owed the duty of observing ordinary skill or care, by which neglect the plaintiff, without negligence, has suffered injury to his person or property. . . . . A man may be as negligent as he pleases to the whole world, unless he owes them a duty." A striking instance of gross carelessness involving injury to others, but not giving those others any right of action against the negligent person, may be quoted: An architect carelessly gave certificates to a builder for work which, as a matter of fact, had not been done. It was held that, whatever his liability to the person who had employed him, he could not be deemed liable for negligence to the persons who, relying on the certificates, had advanced money on mortgage on the property, since he owed them no duty.

Lord Bramwell pointed out that negligence is never absolute and intrinsic; it is always relative to circumstances of time, place, or person. A handbook on the law of negligence, therefore, resolves itself into an inquiry as to the circumstances (of

time, place, or person) under which the law imposes a duty to take care, and, further, as to the amount of care required by the law to be taken in such circumstances. The treatise under review proceeds on these lines; the chapters (subsequent to those devoted to definition, and to the law concerning the onus of proof in actions arising out of negligence) dealing with the duty of care in regard to land, chattels, dangerous operations, and statutory duties; that imposed upon bailees, carriers, professional men, and local authorities; the liability of master for servant; the measure of damages for negligence; Lord Campbell's Act (whereby the right to damages for loss through the death of a party was first established); and, finally, employers' liability at common law, as well as under the Acts of 1880 and 1897. The book possesses the advantages of being well arranged, of having a full list of the cases and statutes quoted, together with a good index, and of being very clearly printed.

Rates and Assessments. By L. GACHES. (Eyre and Spottiswoode.)

The full title of this book—"A Guide to the Law of Parochial and Local Rates and Assessments, with the Practice of the Union Assessment Committee and of Rating Appeals"—is decidedly pretentious; and one is rather astonished to find that the work is of pocket size, and contains less than 160 pages of matter. After perusing it, we must confess to being at a loss to discover what useful purpose its compilation was intended or expected to serve. For the practitioner, a manual of such insignificant proportions can be of no value in dealing with a subject so complicated and so various in its applications as that of rating and assessing, while on the other hand the work is not likely to be of much use to students—the matter being often so condensed as to be quite unintelligible except by the light of considerable previous knowledge. We can best illustrate this criticism by remarking that the whole question of the assessment of water and gas works is disposed of in less than three pages; the principle upon which such assessment is determined being summed up and thrown at the reader's head, without any accompanying explanation, in these two paragraphs:—

> The usual method of assessment of a company's undertakings is to take the total rateable value of all the property of the company, and, after deducting the value of the works, to divide the rest among the several parishes in proportion to the receipts in each.
>
> In order to ascertain the rateable value, the practice is to fix it at 17½ per cent. on the tenant's capital invested in the undertaking.

We may fairly ask what assistance this information, even if correct, would be to anyone who had not, from experience, or from the perusal of works having a just claim to the title of Treatises on Rating, acquired a preliminary knowledge of the subject, and of what value it would be to one possessing such knowledge. Who, from reading the above, would have the least idea of whence the figure of 17½ per cent. was derived, or how the tenant's capital is estimated, or that both figures had been, and still are, the subject of endless contention between companies and assessment committees? This fault of rendering information unintelligible by undue condensation is, however, of quite minor importance compared with that of giving actually incorrect information. But the writer has been guilty of both, for, as our readers have doubtless remarked, the second of the above paragraphs is absolutely incorrect, and, indeed, displays the want of even an elementary knowledge of the subject. The rateable value of a gas company, we may inform Mr. Gaches, is found—according to the usual practice of Assessment Committees which we can, in the space at our disposal, only describe in mere outline—by deducting 17½ per cent. on the capital estimated to be required by a hypothetical tenant for the purpose of carrying on the business, from the revenue derived from the undertaking; correction being made for the assumption that the hypothetical landlord would bear the cost of repairs to works and fixtures. The difference is assumed to be the rent which a tenant would be willing to pay for the use of the whole of the works and fixtures and the enjoyment of the monopoly and goodwill of the business, and is therefore deemed to be the rateable value of the undertaking; the rateable value of premises being their annual value to the landlord, not, as according to the practice defined by Mr. Gaches it would be in the case of gas-works, the income received by the tenant.

Having, thus correctly, in twenty-five words, "defined" the practice of ascertaining the rateable value of a gas-works, the author proceeds to remark, quite inconsistently with his definition of the method of assessing gas undertakings, that "gas companies have a monopoly attached to their undertaking, and the profits of it are attributed to the land occupied by the works. This looks like assessing trade profits." It certainly does; and we have never been able to accept any explanation denying the truth of the suggestion. The author, however, imagines that he finally disposes of such an idea by simply stating that "if profits of trade were valued, the assessment of shops side by side would vary as the business was a success or a failure." As it is precisely the case that, as Mr. George Livesey has constantly pointed out, the more successfully a company is managed the more highly it is assessed, because the tenant is always supposed to rest content with his 17½ per cent., and that, therefore, the assessments of gas companies side by side do vary as the business of each is a success or a failure, this simple statement does not add much of value to the discussion of the vexed question of gas-works assessment.

We notice on p. 19 two mutually destructive statements in regard to premises exempt from assessment. "The Royal College of Music is founded for purposes of teaching the science; paying students do not destroy the exemption. . . . Institutions used for instruction of members and students of a profession are not exempt." Music is generally regarded as an art rather than a science; but, however that may be, it is certainly among the professions.

Mr. Gaches opens his preface with this paragraph—

> The law is simple enough when you know it. It is avoided, and honest folks seem bound hand and foot as if it were a mystery. Yet there is nothing easier to understand; and of all law none is simpler than rating.

Apart from the composition, which, as elsewhere in the book, is decidedly crude, this paragraph strikes one as having been written either by a person of such transcendent genius that what appears to the ordinarily gifted man as complicated appears to him transparently simple, or else by someone who, from want of experience of the subject, has failed to discover its intricacy. We must confess that an examination of the matter in the book does not lead us to adopt the first alternative. We should like to hear Sir Peter Edlin's candid opinion on the passage just quoted.

The book has an index, in which, however, no reference is made to tenant's capital.

PERSONAL.

The Deputy-Chairman of the Gas Committee of the Manchester Corporation, Mr. THOMAS BRIGGS, has been selected for nomination for the office of Lord Mayor for the ensuing municipal year.

The funeral of Sir EDWARD FRANKLAND took place last Tuesday, at Reigate, where the deceased resided. In addition to the immediate relatives, it was attended by a number of representative men of science. Among the wreaths which adorned the coffin was one from the Fellows of the Institute of Chemistry, and another from the Chemical Society.

Mr. F. W. JOHNSTON, who, as already announced, is leaving Mossley for Birmingham, was last Wednesday presented by the employees at the gas-works with a fitted morocco dressing-case, suitably inscribed, as a token of their respect; and on the following evening he was invited to dinner by a large number of his private friends, who asked him to accept a beautiful acacia walking-stick, a meerschaum pipe, and a tobacco-pouch, as mementoes of their pleasant associations with him.

The Meeting of the British Association, to be held at Dover next month, under the presidency of Professor Sir Michael Foster, will have the special feature of being of an international character, as an interchange of visits has been arranged with the French Association for the Advancement of Science, which will hold its meeting this year at Boulogne.

Sea Water for Road Sprinkling.—The plan of using sea water for road sprinkling has now been tried at San Francisco; and the results are said to confirm those previously obtained at some of our own seaside towns. The sea water appears to make the dust cohere, and it is further found that salt deposited absorbs water from the air during the night hours, so that in the morning a street looks as if it had been recently watered.

Profit-Sharing.—From a report issued by the Board of Trade, it appears that profit-sharing in industrial concerns is not advancing rapidly. In 1898 there were 85 profit-sharing British firms (including colonial firms); in the previous year there were 93. The number of workpeople interested, however, showed a slight increase. In 17 firms, no bonus was earned for the workers; in the case of the others, the bonus worked out at about 11 per cent. on the wages.

The Petroleum Output of the World.—According to the "Philadelphia Manufacturer," upwards of 5000 million gallons of petroleum are now produced annually in the world. Of this quantity, 2500 million gallons are produced in the United States, 2250 millions in Russia, and the remainder is distributed among a dozen countries. The United Kingdom is the largest consumer of mineral oils exported by the United States; the total imported to this country in the last fiscal year being 212,265,563 gallons. The total exportation of refined illuminating oil from the United States in the fiscal year 1898 was 900,998,875 gallons; while Russia's exportation of refined mineral oils amounted to less than one-third of this quantity.

Completion of the Second Largest Gasholder in the World.—Our readers are aware that for rather more than a year Messrs. C. & W. Walker have been engaged in the erection at the Saltley Gas-Works, Birmingham, of a large holder capable of containing 8½ million cubic feet of gas. Particulars of the holder and its tank, built by Messrs. John Aird and Sons, accompanied by some constructional details, appeared in the "JOURNAL" for the 18th of October last. Its diameter is 264 feet; and it is in four lifts. When filled it will rise to a height of 160 feet. It is gratifying to be able to record the successful completion of this important example of Mr. Hack's engineering skill; Birmingham being now in possession of the second largest gasholder in the world, at a cost of about £72,000.

COMMUNICATED ARTICLE.

DIFFERENTIAL RATES AS BETWEEN CONSUMERS OF GAS FOR LIGHTING AND FOR PURPOSES OTHER THAN LIGHTING.

By A Gas Engineer.

(*Continued from page* 484.)

Arguments based upon extreme cases, such as *may* occur, but if they *do* happen at all are so rare as to partake rather of the exception that proves the rule, may serve the purpose of a partisan; but they do not aid in the broad general view that should be taken, if the rights of all parties are to be considered, rather than those of one only. And the *reductio ad absurdum* style is always effective. Yet there is nearly always another side to the shield, though it may be momentarily obscured by a cloud of ridicule. Before laughing at the ignorant old woman who buys 12 and sells 13 at the same price, it is well to hear an explanation of the matter from her side of the counter. We may find that her head is screwed on the right way after all. The wisdom of throwing out a sprat to bring in a mackerel is generally recognized in trade. Possibly she has a scheme of this sort in view; and by some obscure but perfectly feasible means, she may manage to show a balance on the right side of the ledger at the end of the year. She may sell for cash and buy on long credit, or pay in kind and not in cash, having a cross account with the egg merchant which leaves her a good profit besides covering the loss on the eggs. The idea of selling butter at two different prices according to a foolish and whimsical rule, is no doubt absurd; and, like the other example, it is by no means on all-fours with the practice of offering gas at special rates for special purposes. In every town, however, there are grocers who supply butter to schools, hospitals, or other public institutions, at prices lower than those paid by the casual purchaser of half a pound; and 99 out of 100 grocers would not hesitate for a moment, if satisfied that there was money in the transaction, about supplying the ordinary 14d. butter at 1s. or less under special contract. Let us suppose that the man who relishes buttered teacakes, but not the idea of someone else getting a supply at 2d. per pound cheaper than himself, calls upon the grocer to remonstrate. We can even imagine him quoting some of the passages from Mr. Newbigging's paper, simply substituting 14d. butter for "gas for lighting." The grocer's reply would probably take this shape: "If I like to give up 2d. per pound off my fair profit, how does that affect you"? It is also quite possible that the grocer, by securing a large contract at 1s., may be able to buy so much more advantageously that he can supply the ordinary customer at 1s. 1d., and thus benefit him while at the same time receiving the old rate of profit. The windows of the shops in our principal towns abound in notices such as "Discount on club tickets," "One shilling in the pound allowed on club tickets," "Railway fare paid to customers from a distance," "Orders over £2 delivered free," "Discount for cash," and other announcements which partake of the nature of differential rates, or of selling similar articles at 1s. 2d. to one and at 1s. to another customer. But the railway business of the country comes nearer to the gas industry, in respect to financial working and division of profits, than the retail shop. Here is a splendid field for Mr. Newbigging, as the traffic, both passenger and goods, is simply saturated with differentiation, and of charging, not two prices, but half-a-dozen for the same service, and of selling the nominal 14d. article for anything down to 2d. If I desire to visit a certain sea-side resort about 60 miles away, I can do so at ordinary fares for 10s. return; but at this season of the year I can get a tourist ticket, and so secure the same service for 8s. 9d. If willing to return the same day—a condition that does not affect the cost price of the service—I can get the same thing for 3s. 6d. By chartering an excursion train, and guaranteeing 500 or 600 passengers, lower terms could be obtained. Then there is a competing railway company whose route is 50 per cent. longer, but who quote similar rates to the above, though the cost price must be greater; so that I can, if so inclined, follow the example of the Irishman who travelled by the slow train because he got more time for the same money. Similar examples could be quoted from the goods tariff, of rates that differ according to a variety of circumstances.

This condition of things is not the result of deliberate choice on the part of the sellers, but has been forced upon them by competition and by the desire to keep their capital fully employed. A tradesman who announced "One fair, honest price to all," might spend his time in contemplating empty chairs, while his neighbour who puts up "Unheard-of bargains," "Desperate sacrifices," and otherwise leads the public to imagine that he is selling at a dead loss to himself or somebody else, has his shop crowded from daylight to dark. If there was a free distribution of Fortunatus caps, the old lady would select a steady sale of eggs at 9d. per dozen, the grocer would meet his large contract at full retail prices, the railway companies would have one all-round tariff at the top rate, and the "87" would have a summer and day consumption sufficient to keep their staff and apparatus fully employed, all at the nominal price with no discounts or abatements. They have not adopted differential prices from choice, as an improvement on the all-round price, but the matter has been forced upon them, as a means of retaining lines of business that show a tendency to drop off, or of securing others that are at present not attainable. Mr. West, I think, ridiculed the idea of price having much to do with consumption for purposes other than lighting, and talked about people who used gas-stoves when gas was 12s. per 1000 cubic feet. The general experience is that the lower the price the greater the day and summer consumption. This desirable line of business did not find general acceptance while gas was over 4s. per 1000 feet. As many gas managers have found, the general use of cooking-stoves does not set in till the gas is reduced to about 3s.; while for gas-engines the limit is lower still. Differentiation is a very general remedy for partial or total slackness of trade, and desperate cases are met with desperate measures. The supply of electricity is a case in point. Electricians soon found that the prospects of business on a steady all-round rate of 6d. to 8d. per unit were limited. So all sorts of arguments about load-factors, average daily consumption, and so on, had been brought in to account for the complicated schedules of prices that form a sort of sugar coating for the objectionable pill. Many of these show a range of 400 to 500 per cent., and are so replete with carefully prepared phrases of the catchpenny character that the only intelligible idea they convey to the customer is that his supply of electricity will be gloriously cheap. In some parts of the world, gas is of necessity priced at 10s. per 1000 cubic feet or more; and under these circumstances the rate differential is much more general than where, as in most of the large towns in the United Kingdom, gas can be sold at one-fourth the price. Under ordinary prices for gas, the differential rate, if it exists at all, takes the mild form of a 10 or 15 per cent. discount or rebate.

Mr. Newbigging attaches some importance to the fact that the 87 are selling at comparatively high prices, and blames this to their erratic administration; thus inferring that if they had kept to a steady single price, they could sell gas as cheaply as others. I submit that this is a mistake, and that the differential price is the effect, and not the cause. Why should the South Metropolitan, the Plymouth, and other undertakings who can sell cheaply and consequently have a steady trade, need to consider differential rates or other means of stimulating business? Or, in a general way, why should undertakings situated almost on the top of coal mines, and getting coal put into the works at something less than 10s. per ton, concern themselves with questions of this sort? The cheap coal alone is sufficient to guarantee a good manufacturing industrial neighbourhood, and to give them quite enough to do in meeting the natural increase. Their prosperous consumers are only too glad to get gas for cooking, heating, or motive power at anything less than 2s. 6d. per 1000 cubic feet, and thus avoid the troubles incidental to solid fuels. But the case is different in localities where coal costs 20s. per ton, and which consequently abound in empty factory buildings, and possibly show a decreasing population. The few struggling industries that are carried on are already heavily handicapped by cost of fuel and carriage of raw material and finished goods, money is not plentiful, and people look carefully after their expenses and do not attach the value to the saving of time and trouble secured by gaseous fuels that is so highly appreciated in busy, thriving districts. These places are especially liable to suffer from excess of capital. In building a new works, or in providing extensions, a reasonable excess is always allowed for future development. A gasholder, for example, cannot be built in halves, and a 400,000 cubic feet capacity only costs 10 per cent. more than a 300,000 cubic feet capacity. In the thriving district, the normal rate of increase is, if anything, exceeded, and the excess is soon taken up; but in the second case we may have a stationary business, or one that is actually going back. It is in such instances that the differential rate is resorted to with success, as a means of securing an increase of business that cannot be otherwise obtained. Before condeming any undertaking for introducing differential rates, the local price of coal, the capital per 1000 cubic feet of gas sold, the sales per annum for the past five years or so, and other circumstances, should be considered.

An example of a company selling, as most companies do, at very little more than "cost price" (using the term in the new acceptation adopted by Mr. Newbigging), is given in the paper; and the deduction is drawn that differential rates could not be adopted in that case without injustice. But some years ago the writer advised an undertaking similarly situated to allow a rebate of 7d. per 1000 cubic feet as a means of introducing gas-engines. Though there was a 100 million business, the largest gas-engine in the district was 2-horse power, and the consumption in this line was not worth notice. The selling price was then 3s. 4d., at which rate the manufacturers said, and with truth, that they could not afford to use large quantities of gas as fuel. In a short time, about forty gas-engines were in use (the largest being of 24-horse power); and this meant an additional 5 millions per annum. The profit on this business, which called for no extra outlay beyond one or two lengths of main, and gave no trouble from "overlap" in the winter, was a material help in bringing about a general reduction to 3s. 2d. As to the rebate helping to keep up the gross price, it represented only about ¼d. per 1000 cubic feet on the whole sales; but of this not a fraction has been indirectly paid by the consumers. It is saved by the fact that the establishment charges, and the

expenditure per consumer and per mile of main, remain the same, and are not increased beyond the limit that they would stand at in the absence of any gas-engine business. In fact, the saving is sufficient to leave a surplus for the profit and loss account that is available for dividends, and therefore assists towards an all-round reduction of price. I do not wish to occupy space with a large number of examples; but this is not an exceptional case. In one instance, the all-round position of the concern was greatly benefited by offering, as an inducement to take stoves, to allow a discount on the increased consumption, as ascertained from a three years' average.

(To be continued.)

TECHNICAL RECORD.

DOMESTIC GAS FIRING AND ITS RELATION TO HEATING AND VENTILATION.

In the abstract of the Inaugural Address delivered by Mr. George Beilby, at the recent annual meeting of the Society of Chemical Industry, which appeared in the "JOURNAL" for the 18th ult. (p. 175), it was mentioned that he gave a good deal of attention to the subject of the present position of domestic gas firing and its relation to heating and ventilation. The full text of the address having now been published in the Society's "Journal," we are able to reproduce this interesting section.

Great efforts have been made by Smoke Prevention Committees to encourage inventors to produce some form of fireplace in which raw coal may be smokelessly burned. After watching these efforts for years, I think we may fairly conclude that a universal grate which, in unskilled hands, will burn all sorts of coal smokelessly, is practically unattainable. We may therefore at once dismiss this class of remedies for domestic smoke. We are then tied down to the application in some practical way of those remedies which are founded on the production of smokeless fuel by the preliminary treatment of raw coal. We have seen that by such treatment it is possible to produce four varieties of smokeless fuel, three of which are more or less applicable to domestic purposes. These are gas, briquettes, and coke.

I have placed these in what appears to me to be their order of merit. In the matter of heating, we know that a great deal has been done by the gas companies to extend the use of gas for domestic stoves and fires. The education of the public in this matter has been chiefly in their hands and in those of the stove makers; and we cannot but admit that great progress has been made in this department. The gas companies have, no doubt, been specially influenced in this movement by the strong desire to secure a daylight consumption of gas which would more fully occupy their distributing plant, and which would thereby help to reduce the heavy on-cost in that department. It has therefore been to their interest to encourage the use of gas for cooking rather than for general heating purposes. Makers of gas stoves and fires have also pushed their wares well under the notice of the public. But if any large part of the 35 million tons of raw coal burned for domestic purposes is to be replaced by gas heating, something very different from the quiet progress of the past twenty years must be contemplated.

We are naturally led to inquire what are the reasons for this comparatively slow adoption of gas heating; for if it is a sufficiently good thing to justify the amount of success it has already attained, surely it ought to be able to attain a very much larger success. The first question which suggests itself in this inquiry is: Are we certain that the householder is being offered the very thing he wants, or is it possible that it is only more easily satisfied householders who are content to accept, as a solution of the domestic problem, the average gas-fire, placed in position by the average gas-fitter, and supplied with average gas at 3s. per 1000 cubic feet?

Some years ago I came to the conclusion that these three average items were combining to give domestic gas heating a rather indifferent reputation. At that time I tried to find out what were the *desiderata* for domestic gas heating, and how, if possible, they might be satisfied. These *desiderata* appear to be warmth and comfort, and ventilation at least equal to that obtainable from an ordinary coal-fire, at a cost not too much in excess of that of the open fire. To satisfy the first two conditions, the gas must be burned in such a way as to deliver as much as possible of its heat as radiant heat which must primarily warm the objects in the lower part of the room—say, from the floor to 6 or 7 feet above it. Convection currents will ensure that more than sufficient heat will be taken to the ceiling and upper parts of the room; therefore special effort must be directed to keeping the heat low down.

The question of ventilation is absolutely vital, and must on no account be left to chance. Apart from the imperative necessity that the products of the combustion of the gas, together with chance leakages of gas, should be removed from the room with certainty under all possible conditions of temperature and weather, health and comfort alike require that the atmosphere of the room should be continuously but imperceptibly changed. The first of these conditions involves the providing of a proper flue connection from the stove to the roof ridge of the house. The second, or general ventilation, requirement must be met by bringing in fresh air from the outside, and removing the warmed and used-up air from the ceiling-level of the room. By preference, the fresh air ought to be delivered into the room at or near the temperature of the air of the lower part of the room.

Let us try now to ascertain how far the average gas-fire and the average gas-fitter can be depended upon to meet these *desiderata*. The gas-fire, as it is now manufactured, is a very fair machine for the conversion of gas into radiant heat of high temperature. A fuller appreciation on the part of the makers of the desirability of the delivery of the maximum amount of heat in the radiant form might lead to further improvements in the concentration of the heat of combustion in the zone of incandescence, and the avoidance of the loss of low-grade heat, by the freer use of non-conductors, and by careful adjustment of dimensions. The chief fault to be found in the domestic gas firing of to-day is with the haphazard way in which the fire or stove is pitchforked into surroundings which are badly adapted for its reception. Fortunately, even the average gas-fitter recognizes that the products of combustion must be removed from the room, so that a flue or chimney of some sort is always provided. But this chimney is almost invariably the vent of an ordinary open fireplace, which is much too large for a gas-fire, and which may be subject to fits of down-blow. A down-blow with a gas-fire may not be so dirty and disagreeable as with an open coal-fire; but it is probably much more dangerous to health, just because it may go on to a very serious extent without being noticed.

We may take it as fundamental that, if domestic gas firing is to be satisfactory, the most perfect provision must be made for the uninterrupted removal of the products of combustion under all conditions of wind and weather. One of the stock arguments in favour of the open coal-fire is that its presence in the room secures a certain amount of natural ventilation. For long no one ventured to criticize the claim; but recently it has been whispered among those who have most closely studied ventilation that this claim is not quite unquestionable. That an open fire with a good chimney draught does drag a great deal of cold air across the room on the floor-level and hurry it up the chimney, we none of us doubt. Our feet are sufficiently good thermometers to tell us this. But that this is satisfactory ventilation may be doubted, seeing that it leaves untouched the warmed and exhausted air which lodges in the upper part of the room.

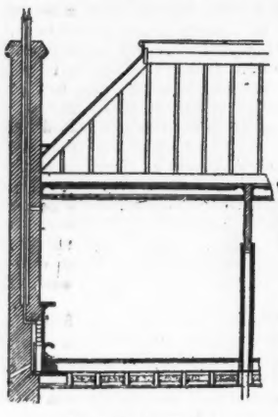
Gas-fires are adapted to the ordinary open fireplace in one of two ways. Either the flue-pipe is carried into the fireplace with a right-angled bend, to direct the flue gases up the chimney, or the chimney is closed by a plate through which the flue-pipe is led. In the former case, as the chimney is left open, there is still the same up-rush of air as with a coal-fire. In the latter case only so much air as can pass through the small flue-pipe is taken up the chimney. In neither case will the action of the chimney be more efficient than with the open fire; and if there is a tendency to down-blow, the risks will remain as before.

I have found, by experiment, that the products of combustion from a gas-fire burning 30 cubic feet of gas per hour can be removed by a stove-pipe from 2 to 3 inches in diameter, according to the length of the pipe and the bends necessary. It is therefore evident that the ordinary 10-inch chimney of the open fire is from 10 to 20 times too large; so that the velocity of the up-current of gas in such a chimney is from 10 to 20 times slower than it need be. One of the first results of reducing the diameter of the chimney, and thereby increasing the velocity of the flue gases by 10 to 20 times, is to abolish all risk of down-blow—no small advantage when gas is to be burned in bedrooms.

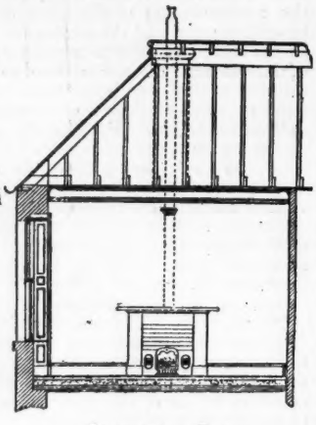
But when the flue-pipe and chimney are so far reduced, it will be found that the temperature of the products of combustion, as they are dismissed from the gas-fire, is far in excess of what is necessary to maintain a sufficient current. Therefore we are at once put in possession of a certain amount of heat which is available for other purposes. When gas is burned in a gas-fire with a moderate excess of air, from one-fourth to one-third of the total heat of combustion escapes with the products of combustion. With so expensive a fuel as gas, this is a serious item.

In designing the arrangement of gas-fire which is illustrated in the diagrams [see p. 538], I have attempted to utilize this heat, partly as direct radiation into the room, and partly for raising the temperature of an incoming current of fresh air. This fresh air takes the place of the hot and exhausted air from the upper part of the room, which is removed through a concentric flue surrounding the flue-pipe of the stove. The products of combustion of the gas-fire pass through a short flue into a shallow box, which exactly fills the space formerly occupied by the grate. The upper part of this box is filled with partitions which cause the flue gases to follow a zigzag course on their way to the flue-pipe, which starts from the upper side of the box, and passes up the inside of the old chimney. The flue-pipe, which is of strong sheet zinc and is about 3 inches in diameter, is led up to the top of the chimney case. The old chimney is closed round the lower part of the flue-pipe, and its upper end is used as a ventilating-shaft for the room—an opening being made into it at the level of the ceiling. A fresh-air inlet is made at the back of the fireplace, the air from which passes over the

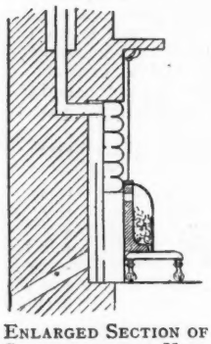
back of the shallow box, and enters the room through openings on either side of the gas-fire. These openings are tubed across the shallow box, so that the fresh air does not enter the box, but passes across it into the room. When the fire is burning, the front of the shallow box is kept hot by the flue gases, and radiates a considerable amount of heat into the room. The flue gases, as they pass from the box, still contain sufficient sensible heat to ensure a vigorous draught up the small flue-pipe, and also to maintain a ventilating current in the annular flue. These designs are not patented or protected in any way; and I shall be only too glad if their publication contributes to an improvement in the efficiency and economy of domestic gas-fires.



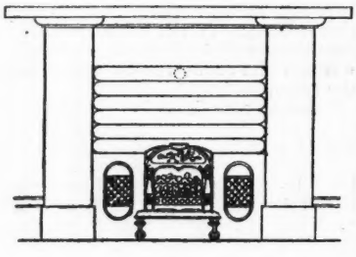
SECTION OF ROOM, SHOWING GRATE AND FLUE.



SECTION OF ROOM, SHOWING GRATE IN ELEVATION.



ENLARGED SECTION OF GRATE, SHOWING VENTILATION SYSTEM.



ENLARGED ELEVATION OF GRATE, SHOWING AIR-INLETS AND HEAT-RADIATOR.

Though some of the details of this arrangement have been only recently evolved, the more important features have been in use now for a considerable time; and the experience of the arrangement has clearly indicated that the leading principles are sound. The small flue and chimney have been an absolute cure for down-blow in the case of one chimney which had been a very grave offender when it was worked with an open coal-fire. The recovery of a large part of what was formerly the waste heat of the flue gases, has effected a very marked economy in the gas consumption; while the provision for the warming of the room from the floor upwards has added considerably to the comfort attained by the system, especially when used for bedroom warming. During the coldest nights of the past winter, a comfortable temperature was steadily maintained in a room with outside walls facing N.W. and N.E., and containing 2700 cubic feet of air, by a consumption of gas of from 10 to 15 cubic feet per hour.

While there is no immediate prospect of any considerable reduction in the price of illuminating gas, yet, as the larger changes in the destructive distillation of coal, which we have been considering, come about, it will be possible to deliver gas to the private consumer at a considerably lower cost than at present. It is not sufficiently recognized that, of the three principal items which make up the cost of gas to the consumer —namely, the manufacturing cost, the distributing cost, and the capital charges—the two latter are by far the heavier. Coal gas could be delivered into the gasholder at from 10d. to 12d. per 1000 cubic feet, and at half this price if unenriched coke-oven gas were supplied. But distribution and capital charges add from 18d. to 30d.; bringing up the total to from 2s. to 3s. 6d. per 1000 cubic feet. If gas for domestic heating were to replace any considerable part of the 35 million tons of coal at present used for that purpose, the mere increase of output at the gas-works would very considerably modify these items of cost; and I am hopeful that the town consumer may yet get a thoroughly satisfactory gas at from 1s. 6d. to 2s. per 1000 cubic feet. At such prices, gas heating would compare favourably in cost with coal-fires.

There is no doubt that the extension of domestic gas firing would be more rapid, as well as more satisfactory, if the architect and builder were to co-operate with the gas engineer so that new houses might be deliberately planned and prepared for gas firing by the introduction of proper chimney and ventilating arrangements. If good models of such installations were to be seen at work in every large town, the education of the average householder would proceed on much more satisfactory lines. The more intelligent householders must be assured in some practical way that their rooms can be warmed and ventilated more satisfactorily by gas than by coal fires. They must further be assured as to the real cost of gas heating, so that they may be in a position to judge under what conditions the advantages of gas will compensate for this extra cost. I can imagine no better opportunity for the fitting up of well designed and executed installations than is afforded by the modern development of the "flat" system in London. How far gas heating may have been adopted in any of these mansions I do not know; but if a perfect system were evolved by the architect and the scientific gas engineer working in concert, the convenience and comfort of the system would be so appreciated that it would speedily become universally adopted in such mansions; and we may be certain that from these it would spread to clubs, boarding-houses, hotels, private houses, and offices.

The general principle which I have adopted in dealing with this subject—namely, that we must try to grasp the true relations and proportions of each and every department of it—compels us to recognize that the replacement of 35 million tons of raw coal by gas for domestic heating, even if it were most desirable, could only be very slowly accomplished. Nor must we forget that the distillation of this coal would leave us with 60 to 70 per cent. of its weight in the form of coke, the disposal of which must be duly provided for. It is well known that coke, as such, is not a favourite fuel for domestic purposes. Therefore it is unlikely that any large proportion of an increased production of coke would be disposed of as fuel for private houses.

This difficulty brings us round again to the consideration of fuel briquettes as an outlet for the bye-products coke and pitch, and as a means of supplying a clean, convenient, and comparatively smokeless domestic fuel. While the ordinary householder accepts raw coal as a necessary evil, only the favoured few who can afford to burn the most expensive qualities of house coal can count upon obtaining a uniform and satisfactory article. The coal merchant, like the wine merchant, keeps a very imposing array of well-known names on his list. But the consumer soon learns that it is one thing to have a well-known name on the list, but quite another to have in his cellar the actual product it represents. The coal we most of us burn is certainly a very crude and uncertain form of fuel. While there may be economy in burning such crude fuels in situations which are near the pits, and where railway conveyance is not an important part of the cost, such economy is bound to disappear whenever a long railway carriage is involved; and in these cases it would be actually cheaper to carry a clean fuel than a dirty one.

I believe that the fuel briquette has very great possibilities before it as a domestic fuel. The materials at the disposal of the briquette maker, together with the power he has to vary the size, shape, and texture of the briquettes, should enable him to adapt his product to meet the requirements of the householder. The manufacturer who will take the trouble to go carefully into this matter may rest assured that he will find intelligent consumers ready to absorb his output. But it must be the manufacturer's first business to find out exactly what the consumer wants. The consumer does not always know this himself. But he does know quite unerringly when the thing supplied to him is *not* what he wants; and no amount of persuasion will lead him to accept the imperfect substitute.

The warming of our houses is too intimately associated with our sense of comfort ever to remain for long at the mercy of fad or fashion. We may be satisfied to provide the friends who visit us with picturesque, but unrestful, chairs, because our upholsterer persuades us that they are fashionable or artistic; but we invariably settle into a comfortable, if unfashionable, lounge for our own hours of ease. I think fuel and fires come sufficiently close to our real selves to be out of the reach of mere affectation; so that any changes in these must be genuine improvements if they are to be acceptable. Whenever a really improved fuel is presented to the householder, we may feel pretty sure he will gladly accept it. Carlyle's unflattering remark about the majority of his fellow-countrymen does not apply to them in relation to the solid comforts of life. If gas-fires and fuel-briquettes have not hitherto met with general acceptance, I suspect we must admit that it has been the producers, not the consumers, who have been lacking in wisdom.

Russian Weights and Measures.—A new regulation on Russian weights and measures has been officially published. The pound is fixed as the standard of weight, and declared to be equal to 409·512 grammes; a pail, or vedro, is to hold 30 lbs. of distilled water at 16⅔° (Celsius). The unit of length is the arshin, equal to 71·12 centimetres. The metric system is to be optional, and may be used on a par with the Russian in commerce in dealing with contracts, accounts, &c., and, after mutual agreement, by state and municipal authorities. Private persons, however, need not use it when dealing with them.

GAS-PIPE ENGINEERING.

In the "JOURNAL" for the 11th ult., we reproduced from the "American Gaslight Journal" an article specially written for that publication by a "Gas Engineer," dealing with some practical topics on the above subject. The author has since contributed to our contemporary the following additional observations thereon:—

In piping to a reservoir, it may be necessary to connect a safety-valve, in which case some calculations will have to be made. We may have dead weight on the valve, or we may have it in the form of a spring (which is the idea involved in the pop valve), or we may use a small weight, and put it on the end of a lever, as in fig. 1; and if we have 100 lbs. at a leverage of 4 to 1, it will exert a downward pressure of 400 lbs. Here is a force tending to lift a valve; and this force is the pressure-times the area of the valve, and all you have to do is to keep it closed. The simplest rule for calculating is this: Multiply the pressure by the area of the valve, and divide the product by the weight of the ball or the other weight at C. Multiply the quotient by the distance from the fulcrum B to the centre of the stem D, and the product is the distance from the fulcrum to the set ball. In other words, the total pressure on the valve, divided by the weight of the ball, gives the ratio of increased leverage. You can reverse the problem, and tell what weight the ball should be at a distance a certain number of times the distance from the fulcrum to the stem, by dividing the total pressure on the valve by this ratio.

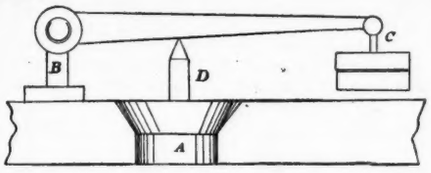


FIG. 1.

Gas that is confined in a pipe or a cylindrical retort acts with a certain pressure in all directions. It pushes directly up and to every angle from the perpendicular; and it pushes on the heads and the bottom as well. The pressure on the shell will therefore be a certain amount on every square inch of that pipe or cylinder; and the total pressure will be the number of square inches it contains multiplied by the gas pressure. The bursting strain is the diameter of the pipe multiplied by the pressure. The lower half of the pipe must never be considered as pulling in one direction and the upper half in another, like two tug-of-war teams—the middle portion of the pipe having to stand both pressures. One pressure simply acts as an abutment against which the other one can push, so that the strain is only equal to what one side would give. From this it will be seen that one side of a shell must stand a strain when under pressure equal to one-half the diameter multiplied by the pressure.

Girth joints are usually single riveted; but, if properly designed, they are stronger than the double-butt strap triple-riveted longitudinal joint. If we take, for instance, a hollow cylinder of steel, we have an ideal shell, without heads or joints, $\frac{3}{16}$ inch thickness of metal, and a tensile strength of 4000 lbs. per square inch of section. If this shell is burst by pressure, the fracture can run longitudinally its length along the largest diameter. At the moment of rupture, the strain on the metal must be equal to its tensile strength. The area of plate to be broken is the length of the cylinder in inches multiplied by the thickness; and the strain on each inch is 4000 lbs. at the moment of rupture. The total pressure tending to force the two halves of the cylinder apart is equal to the pressure per square inch multiplied by the area of the cross section of the cylinder or pipe. Those who are not familiar with this sort of calculation sometimes find it hard to understand why the surface of the shell is not used instead of the area of the cross section. The answer is that the pressure on the upper half, for example, does not all act in the same direction, owing to the curvature of the shell. The pressure on parts that are close to the centre line acts almost horizontally; while on the parts lying along the top of the pipe or shell it acts vertically.

Useful forms of making wood connections in the construction of jacks for putting up gas-pipe systems are shown in figs. 2 and 3. A plan for double-split wedgings is shown in fig. 2, in which the tenons are divided, and the wedges E E driven firmly into place. The design of joining represented by fig. 3 is effected with a bolt and nut F. The body-piece is bored straight for the bolt, and the joint is made by cutting a cavity in the second piece. The nut is prevented from turning by the sides of the cavity; so that by turning the bolt-head the pieces may be drawn together, and secured with great firmness.

All duplex pumps having rods pressed and riveted into pistons, as at G, fig. 4, should not be allowed to pass without having such rods changed to others screwed and riveted into pistons, as at H, fig. 5; otherwise trouble with these working loose will almost invariably result. All air cylinders should be left bare, to reduce as much as possible the high temperature resulting from compression. At the most, none other than a ventilated cylinder cover of netting, perforated steel, or similar material, should be employed. In repairing a 6-inch pump, an oil-cup should be placed in the top air-cylinder head at the left of the stuffing-box. In some plants, a jet condenser is operated for the purpose of condensing to form a vacuum on the opposing side of the piston of a pump. The condensing chamber of a jet condenser is shown in fig. 6. Connection is made with the exhaust by a pipe; and the injection-pipe which conveys the material for condensation purposes into the injection chamber is marked I. Place drain-valves at the bottom of the column and gauge-glass, and drain the pan under by cocks—piping all to it. Use brass pipe and fittings, to permit of easy removal for repairs.

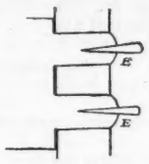


FIG. 2.

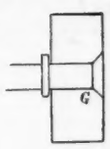


FIG. 4.

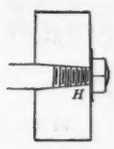


FIG. 5.

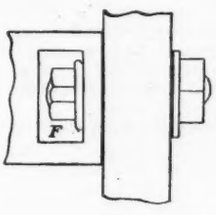


FIG. 3.

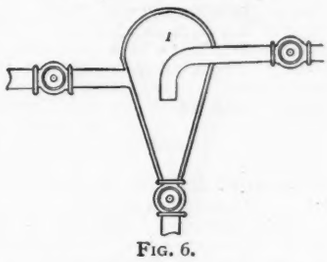


FIG. 6.

If the suction is poor on the up stroke of the piston of the air-test pump, and there is no blow at the oil-cup on the downward stroke, it is safe to conclude that back leakage into the lower end is occurring from the main reservoir of the pump itself back into the cylinder, and that it may be due either to leaky discharge valves or to air passing round the bushings. Practice will enable this to be much quicker done than told. In testing the pump, it should be determined that the piston-rod packing is in good condition. When a pump seems to run too slow or to blow bad, try it with an exhaust-pipe disconnected, using a short piece of pipe bent to turn the force away from the jacket. This will indicate any obstruction in the exhaust-pipe, and will demonstrate and assist in locating any blow in the cylinder. To locate trouble where the suction is not good, stop the pump, open the oil-cup, and note whether or not the air blows out of the cup. If this occurs, it indicates leakage back from the main reservoir. To determine this, stop the pump; and if the latter is the case, the blow will continue after the piston has come to rest. Where the bottom head has a plug, removing this will indicate whether back leakage is taking place into the lower end of the cylinder; or when that is not possible, the lower receiving valve should be removed with a piece of wire. This will render unnecessary the removal of the plug.

In bending metal pipe, it is very essential to get the scale and any gummy substance from the inside of the pipe. This is best done by blowing it out after bending. Pipes should be blown out several times; and the pipe should also be rapped lightly to loosen the scale. If steam cannot be had for this purpose, air will do. Some gas companies and gas-fitters have had rather a bitter experience through using cheap pipe; for they find that, in bending, it splinters—the trouble being caused by steel being mixed with the iron. The best pipe is always the cheapest in the end. If possible, tests of the pipe should be made to ascertain its adaptability for the work required. The most important compounds of iron for gas piping are red and brown hematite, spathic iron ore, magnetite, pyrites, and other bodies. With the exception of pyrites, all the above minerals are available for the manufacture of iron for pipe; but, as a rule, the iron-master prefers to have only the oxides. In pipe made of mixtures of steel and iron, splintering is liable to occur when bending or welding.

When gas-pipes are carried through water in tanks, as in dye-houses, bleacheries, and steam laundries, the metal often becomes coated with a hard scale difficult to remove; and it will be found that the addition of some caustic soda and steaming for some hours, according to the thickness of the scale, just before cleaning, will greatly facilitate that operation—rendering the scale soft and loose. Tannate of soda is a good preparation for general use; but in waters containing much sulphate, it should be supplemented by a portion of carbonate of soda or soda ash. For muddy water, particularly if it contains salts of lime, no preventive of incrustration will be effective except filtration; and in almost every instance the use of a filter, either alone or in connection with some means of precipitating the solid matter from solution, will be found very desirable.

The temperature of the contents of gas-pipes may be taken with thermometers specially designed to fit into a $\frac{1}{2}$-inch hole drilled in the pipe; or such a hole may be drilled and a plug screwed therein, the centre of which has been drilled to form a cup. This cup is filled with oil; and a thermometer set in the

oil will give the temperature of the gases surrounding the plug. The thickness of the metal will make no appreciable difference. The temperature of the uptake can also be ascertained by filling a pot with cylinder oil, and lowering into the centre—the thermometer being set in the oil-pot. The pot is then withdrawn and the thermometer read. Or a pyrometer may be used.

To determine the condition of gauges, a test-gauge should be attached. As some cylinders are so located as to make it impossible to connect a test-gauge to the head, a T should be put in a suitable place in the pipe leading to the cylinder. Should any repairs be necessary, it is desirable that the parts be sent to the general repairing shop; thereby ensuring the proper adjustments and arrangements of the structural parts. The parts of one gauge should never be exchanged for those of another. As to the effective lubrication of the frictional parts of gauges, the writer has experimented with various oils, and has concluded that good results can be had from almost any high-grade oil, providing it has sufficient body. Valve oil does not always imply good oil. Some engine oils are of heavier body than some poor valve oils. Good valve oils are preferable to good engine oils for lubricating the cylinder and other parts of the test-gauge. Pouring a drop of oil to be examined on to a well-cleaned glass plate placed at an angle, and noting the time it takes for the oil to reach a mark on the bottom of the inclined plane, will indicate to some extent the viscosity and clinging power of one oil as compared with another. By increasing the temperature by means of an alcohol lamp or otherwise, one can likewise judge the uniform consistency of an oil, in comparison with similar tests made with oils of proved efficiency.

Packing clay, as used by gas-pipe fitters, is mixed with such substances as fragments of rock, quartz, feldspar, and mica, with carbonate of lime, magnesia, the oxides of iron and potash. The gritty particles reduce the plasticity of paste composed of clay and water, and diminish its chances of sticking. The iron stains the wet clay, while the lime decomposes the magnesium and zinc chlorides, destroys the antiseptic properties of the latter, and, by forming calcium chloride, alters the composition.

A pure lead for pipe connections should answer to the following tests: It is completely soluble, without effervescence, in dilute sulphuric acid. No other white pigment will answer to this test; and any considerable effervescence would indicate adulterations with white lead or whiting. A slight effervescence may be neglected; it being due to the presence of a small quantity of zinc carbonate, the formation of which during the process of manufacture cannot always be avoided. If the sample show signs of being adulterated, it will best be treated with hydrochloric acid and boil—effervescence indicating the presence of white lead and whiting. Any crystals forming out of the solution on cooling indicate white lead or sulphate of lead; any residue left after treatment with acid would show barytes, gypsum, or china clay. Which of these bodies is present can be ascertained by the application of special tests.

Figs. 7 and 8 are sketches of a cylindrical steam-heater for expanding gas-pipes of large diameter by heat for purposes of putting in sleeves. The tubes are made to conform to the pipe, and are connected by T-pieces to a section of pipe. In the centre of this connection is the pipe running to the steam supply.

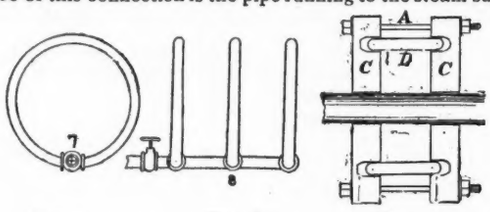


FIG. 7. FIG. 8. FIG. 9.

Fig. 7 is a front view of the form; and fig. 8 a side view. After the pipe is expanded sufficiently, the bushing, which is previously turned to an iron-and-iron fit and mounted, is pushed into the pipe by hand, and the pipe allowed to cool. If necessary to remove the old rings by cutting, use a small round-nosed cape chisel, and cut a groove in the old metal, in the centre, the full length. The metal should easily come out in two pieces, leaving the box clear. If the metal does not start, use a thin chisel on the sides to loosen it. Wipe out as dry as possible every point of metal contact. The writer has in some cases made an old bolt red hot, and burnt out all particles of grease, by laying it in the box; and he has also used this plan to heat up a box in cold weather, to prevent the babbitt from chilling when pouring. The lifting-jet rings are now usually located in the body of the injector for convenience; but this is not necessary. In some cases they have been placed in the overflow, in the pipe beyond the injector, or in the suction-pipe just below the injector. When the lifter is in the injector or the suction-pipe, it has to force the contents into the combining-tube for priming; while with the lifting-jet in the overflow or discharge pipe, it is drawn into the injector-tubes instead of being forced.

The pressing device for clamping over a leaky or fractured gas-pipe shown in fig. 9 is very simple. Two iron flanges are bored in the middle for a strong steel shaft. The flanges C are drilled with a series of holes for the threaded bolts A. The pipe is placed between the flanges as shown, and pressed by the gradual turning down of the heads. To prevent expanding, a steel cylindrical piece surrounds the disc. This cylinder is shown in section at D. Slots are cut in the flanges to receive the edges of the cylinder as the former are drawn closer together. Clay or other material with which the spaces are packed can be squeezed down on the pipe in this device. It may be necessary to heat the pipe for some purpose. The following table will enable the temperature to be judged by the appearance:—

Appearance.	Temperature. Deg. Fahr.	Appearance.	Temperature. Deg. Fahr.
Red, just visible	977	Orange, deep	2010
,, dull	1290	,, clear	2190
,, cherry, dull	1470	White, heat	2370
,, ,, full	1650	,, bright	2550
,, ,, clear	1830	,, dazzling	2730

To harden, the writer uses yellow prussiate of potash, heats the pipe red, or makes it hot enough to cause the potash to run, gets an even heat all over, and then plunges in soft or hard water. He has found this plan very satisfactory. All the rivet-holes in gas-pipes, flanges, and joints should be drilled; and they must compare one with the other. When the pipe-fitter finds two or more holes that do not come even with each other, he may drive a steel pin into the offset holes, and stretch one side—thus making the holes oval—until the rivet will go through.

The home-made testing-gauge shown in fig. 10 will be useful for ascertaining the pressure developed in pipes and cylinders by materials used expansively, or by products of the combustion of hydrocarbons. The device consists of the circular-shaped piece of glass tube A, which is secured to a wood block or base C by means of the bracket B. This tube is partly filled with a mixture of coloured water and alcohol, represented by the dark portions in the tube. An index for reading purposes is then provided, and gauged off with figures on the principle of the anemometer. The top of the glass tube next the bracket is connected into a rubber tube, or a pipe provided with a valve at E; and

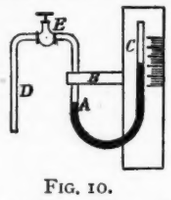


FIG. 10.

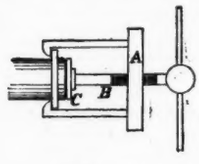


FIG. 11.

this pipe is joined to the cylinder or pipe by the connection D. The valve being opened, the force of the power within the cylinder moves the contents of the tube in proportion to the energy employed. The scale is laid out to indicate the total difference in the level of the fluid in one loop of the tube with the fluid in the other loop, for which purpose it is necessary to have the fluid stand at precisely zero in both loops, or at a level when the tube is opened to the atmosphere, or not subject to any pressure.

China clay, coal tar, &c., for gas-pipe protection in exposed places should be tested before using. A microscopic examination of the deposits will reveal the nature of the grit in the clay; or a paste may be mixed with water and rubbed with the finger. The latter method may be adopted with advantage when testing the relative greasiness of feel. If roughness is detected, lime or chalk is probably present. To determine this point, pour on a few drops of hydrochloric acid, when the lime will effervesce. Inferior clays are often improved by heat, and occasionally by chlorine and acids. A bluish-white clay is considered superior to a yellowish-white one.

It frequently happens that the gas-pipe fitter or engineer is called upon to remove from the pipe an adjustable flange. A handy tool for this purpose is shown in fig. 11. The bar A is of steel, and is bored at the centre for the push-rod B, which should be tapped into the bar with a good thread. A handle should also be put on it for turning. Provide a cap at C, to press on the end of the pipe while the hooks are drawing on the flange. The hooks are set into the edges of the bar as shown, and considerable drawing power is obtained by turning the screw. This tool will draw off a pipe a flange or anything else.

The Clarification of Water.—The clarification of water by sedimentation, assisted by coagulation, is now practised at Kansas City (Mo.), under the direction of Mr. Wynkoop Kiersted, Chief Engineer of the Water Department. The water was formerly drawn from the Missouri River and allowed a period of sedimentation in settling-basins of 60 million gallons capacity. These are subdivided into four compartments by masonry walls, and depressions 125 to 180 feet long have recently been constructed in the partitions. The water, in passing over these weirs, after partial clarification by natural sedimentation, receives a solution of the coagulent, which is forced by a pump through a series of $\frac{1}{4}$-inch pet cocks attached to a line of $1\frac{1}{8}$-inch pipe. The period of sedimentation is variable and dependent on many conditions, such as the character of the sediment in the river water, alkalinity, the time of introducing the coagulant, the manner of taking the raw water into the basins, and the physical condition of the basins. At times two basins will give as clear an effluent as four. No average time can be stated, as it is largely a matter of management.

REGISTER OF PATENTS.

Producing Gas for Illuminating and other Purposes.—Böhndel, H. H., of Hamburg, and Yeaton, C. C., of Lombard Street, E.C. No. 16,670; July 30, 1898.

This invention has for its object "the production of gas in such manner as to reduce the liability of an accidental explosion to a minimum."

The patentees propose to "impregnate a highly absorbent material with benzene, gasoline, or petroleum spirit, naphtha, petroleum, sulphuric ether, or other suitable light hydrocarbon, and enclose this in a sealed receptacle provided with an inlet or inlets communicating with a suitable source of air supply and an outlet or outlets communicating with the gas-supply pipes." The absorbent material proposed is "obtained by calcining or roasting kieselghur or infusorial silica in a blind furnace or muffle oven; thus freeing it from organic impurities, and increasing its absorbent capacity. After impregnation with the hydrocarbon, this material, when enclosed in a sealed receptacle, will be found, under normal conditions, to fix the hydrocarbon to a certain extent, and to emit little if any hydrocarbon vapour; the danger of an explosion being thus obviated. When gas is required for use, a draft of atmospheric air is passed into the sealed receptacle from any suitable source of supply. This air, during its passage through the receptacle, comes in contact with the absorbent material impregnated with the hydrocarbon, and derives therefrom a sufficient quantity of the hydrocarbon to render it combustible, and enable it to emit a brilliant light when conveyed through the outlet from the sealed receptacle to a suitable gas-burner and ignited. The relative amount of hydrocarbon absorbed or extracted from the kieselghur by the air in its passage through the sealed receptacle is very small; but the resulting mixture of air and hydrocarbon constitutes a highly luminiferous and combustible gas, which is suitable for heating, lighting, or other purposes for which combustible gas is applicable." When starting the process, the absorbent material should be saturated; but the patentees remark that there should be no unabsorbed liquid hydrocarbon present in the sealed vessel. As the production of the gas proceeds, the amount of hydrocarbon contained in the absorbent will become gradually reduced until it has all been completely extracted by the air.

[The above specification is given, practically speaking, in its entirety, as not many months since there was a proposal mooted to sell the "invention" on the London market—with only negative results, so far as present information goes.]

Regulating the Production of Acetylene.—Lake, H. H.; a communication from R. Turr, of Paris. No. 20,996; Oct. 5, 1898.

In order to produce the acetylene at will, and stop the manufacture without fear of over-production, the patentee proposes to employ liquid or semi-liquid carbides of hydrogen—especially naphtha and all its derivatives, and likewise non-solid fats—by arranging them in such a manner that in contact appliances, without the pressure of the gas itself, the water necessary for the reaction leaves upon the carbide, as soon as the reaction has taken place, a deposit of the substances named, the effect of which is that a gasholder is not necessary. The apparatus employed is, in construction, very similar to the well-known hydrogen flask or apparatus for use in laboratories for the production of hydrogen; and it "is based upon the peculiar action of petroleum, toluol, and so forth, and generally speaking of liquid hydrocarbons varying in density between ·7 and ·8." These products have the property of arresting the action of water upon the carbide immediately the latter is immersed in one of them; while at the same time it permits the carbide to be again attacked as soon as it comes into contact with the water.

Regenerators for Gas-Retorts, &c.—West, J., of Miles Platting, Manchester. No. 8779; April 26, 1899.

This invention relates to improvements in the construction of the waste-gas and secondary-air flues and passages of regenerators for gas-retorts, smelting furnaces, coke-ovens, and kilns. It has for its object to construct the vertical walls of a regenerator independent of the horizontal

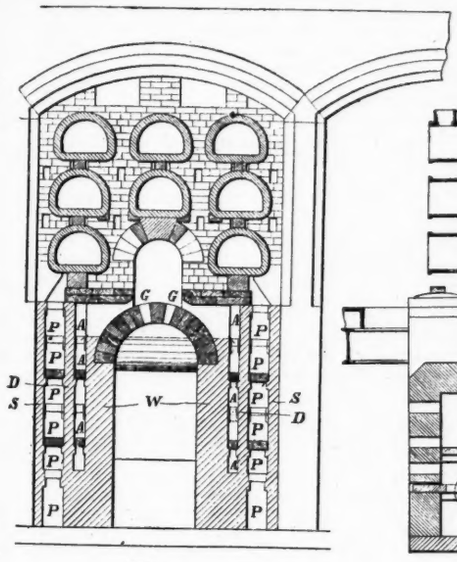


Fig. 1.

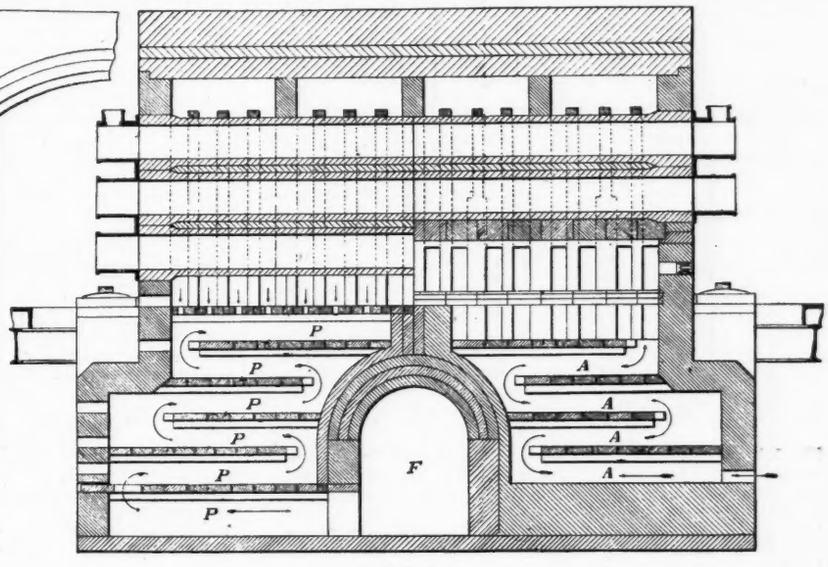


Fig. 2.

divisions forming the gas and air passages, and supporting the horizontal divisions on ledges or recesses on or in the vertical walls.

Fig. 1 is a front sectional elevation of a regenerator setting of gas-retorts. Fig. 2 is a longitudinal section through the waste-gas passages and the secondary-air passages.

In fig. 1 the division-wall D divides the waste-gas passages P from the secondary-air passages A. The space between the producer-wall W and the division-wall is divided into a number of secondary-air passages by means of horizontal divisions built of bricks or tiles, and which are so arranged that the incoming air is caused to travel in a horizontal zig-zag direction as it flows upwards to the producer gas at G. The space between the wall S and the division-wall D is divided into a number of waste-gas passages P by means of horizontal divisions built of bricks or tiles, and which are so arranged that the waste gases, on their descent to the main chimney flue F, are caused to travel in a zig-zag direction. The horizontal divisions forming the secondary-air passages do not enter or bond with either of the vertical walls D and W, but are supported in position by ledges formed in the division-wall D and the producer wall W. The horizontal divisions forming the waste-gas passages P do not enter or bond with either of the vertical walls D and S, but are supported in position by ledges formed in the division-walls D and the side wall S. These ledges consist of bricks, tiles, or splays projecting out of each respective wall. They extend the whole length of the horizontal divisions, and add strength to the division-wall D, and also prevent the jointing material between the vertical walls and the horizontal divisions from falling through.

It is claimed that this method of constructing a regenerator not only ensures a perfectly tight and strong division-wall, but the horizontal divisions form effectual stays thereto; and as they are not in any way bonded to the vertical walls, provision is allowed for vertical expansion or contraction, and there is practically no risk of fracture to the horizontal divisions, or to the division-wall D. Consequently, the tendency to produce "short-circuiting," or the drawing of air from the air-passages A to the gas-passages P, is reduced to *nil*.

Automatic Gas-Lighters.—Schultze, K., of Berlin. No. 11,015; May 26, 1899.

This automatic gas-igniter consists of threads of cotton or like material impregnated with nitrate of aluminium or other highly refractory soluble earth, and arranged side by side, or formed into bundles, and connected with each other by very thin platinum wires wound round the threads or bundles, or formed into a kind of mesh, so as to represent a metallic web or tissue in which the impregnated threads may be enclosed.

In addition to the nitrate of aluminium, the threads may also be impregnated with a solution of glaze-platinum—that is, platinum freed from chloride, and formed by the combination of freely divided and distributed platinum and bituminous substances, especially fossil resins. Platinum salt is dissolved in any suitable solvent; the resin or other bituminous substance being then soaked with this solution, and the whole subsequently exposed to the action of a reducing agent. The result is the so-called "glaze platinum" well known and used as a decorating medium for ceramic wares, when mixed with oil of turpentine in any desired proportion. The degree of strength of this second impregnation of the various threads may differ from the first, inasmuch as the second solution may contain different qualities of the glaze-platinum, so that there are used as many solutions of different percentage as there are threads in a bundle. The weakest solution contains very little of the platinum, whereas the strongest is a rather concentrated one; while the strength of the medium solutions, with regard to each other as well as to the weakest and the strongest ones, is preferably equal.

If a bundle with such threads is heated to about 75° C., and is then brought in contact with illuminating gas, says the patentee, the threads commence at once to glow intensely, and ignite the gas. To heat the bundle of threads to the temperature mentioned, one of the threads may consist of sponge platinum or be impregnated with a solution of sponge platinum; or a certain quantity of spongy platinum may be secured to the bundle of threads as a separate piece. The platinum sponge may, of course, be replaced by any platinum-compounds, which, in the presence of hydrogen or of mixtures of gases containing hydrogen, become strongl

heated—the impregnated threads requiring only a certain increase in temperature to become quickly brought to a white heat, and thus effect the ignition of the gas.

Most earths—such as aluminium, thorium, zirconium, and the like—combine with each other at a white heat, and in the presence of metallic platinum, in such a manner that they incorporate the platinum in a finely-divided state at the place of contact with each other—the fine division of the platinum resulting probably from its evaporation, as the finely-divided platinum remains alloyed with the earth or earths as long as it continues in contact with the exterior metallic platinum. When, however, this contact ceases, the platinum spot disappears in consequence of the continuation of the white heat, which is the reason (the inventor remarks) that automatic igniters as hitherto made cease to have any effect after a comparatively short time. To keep the automatic igniter lastingly able to produce the effect desired—in other words, to prevent the fine particles of the alloyed platinum from losing contact with the exterior metallic platinum—the fine platinum wires that are wound around the bundle of threads have been provided with the object of always replacing the platinum consumed by evaporation. In order, however, to continually maintain the precipitation of the platinum upon the base or body of the earth or earths, it is important that the platinum has no earthy cover, but that it should be perfectly clean; otherwise there cannot be the proper contact between the platinum and the earth, and the effect would not with certainty be obtained.

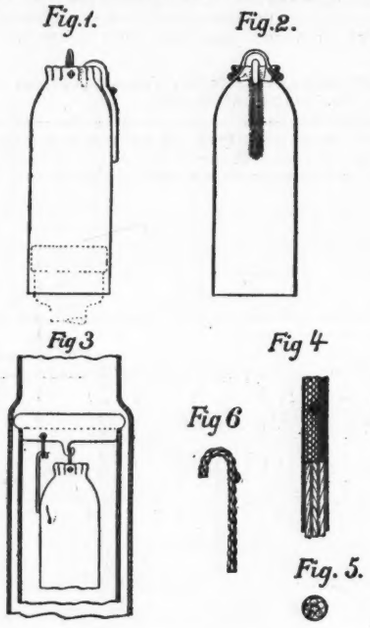


Fig. 1 is a side view of an incandescent body provided with such an improved automatic igniter. Fig. 2 is a vertical section through the incandescent body. Fig. 3 shows another arrangement of the igniter with regard to the incandescent body; the parts being shown located in the interior of a double chimney. Fig. 4 is an enlarged side-view of a part of the igniter with the platinum cover partly removed. Fig. 5 is a horizontal section through the parts shown in fig. 4. Fig. 6 is a full view of the igniter, drawn half size.

APPLICATIONS FOR LETTERS PATENT.

16,287.—Praag, D. J. van, and Harker, F. W., "Acetylene generators." Aug. 10.
16,328.—Dubuisson, G., "Water-meters." Aug. 10.
16,371.—Prestwich, J. A., "Gas and oil engines." Aug. 11.
16,381.—Witkowitch, W., "Heating or cooling gases." Aug. 11.
16,419.—Leatherbarrow, J. B., and Margetts, T. B., "Street and other lamps." Aug. 12.
16,426.—Hilberg, E., "Acetylene generators." Aug. 12.
16,446.—Nielsen, J., "Acetylene gas apparatus." Aug. 12.
16,456.—Chauvin, E. L. H., "Generators for acetylene gas." Aug. 12.
16,459.—Ponces, J., "Acetylene gas-generators." Aug. 12.
16,490.—Lemoine, P. L., "Gas-turbines." Aug. 14.
16,509.—Abel, C. D., "Gas and oil engines." A communication from H. Eckhardt. Aug. 14.
16,618.—Knapp, W., and Steilberg, R., "Production of compressed gas." Aug. 16.
16,619.—Knapp, W., and Steilberg, R., "Production of illuminating gas." Aug. 16.
16,638.—Berger, H., "Acetylene gas generator." Aug. 16.
16,687.—Kennedy, R., "Gas or oil engines." Aug. 17.
16,694.—Scouller, C., "Gas fire-lighter." Aug. 17.
16,706.—Golby, F. W., "Bunsen burners." A communication from J. G. Houben. Aug. 17.
16,724.—Albert, G. L, Count de Hamel de Manin, "Incandescing or light-emitting bodies." Aug. 17.
16,735.—Theisen, E., "Gas-washers." Aug. 17.
16,763.—Worsnop, C. H., "Preparing carbide of calcium." Aug. 18.
16,794.—Tweedie, R. O., "Anti-vibrating arrangement for incandescent gas lighting." Aug. 18.
16,824.—Grauer, E., "Production of calcium carbide." Aug. 18.
16,829.—Huse, F. R., "Chimneys for gas-burners." Aug. 18.
16,888.—Brandon, R. H., "Gas-engine." Aug. 19.
16,894.—Lake, H. H., "Suspension gas-lamps." A communication from W. Fähndrich. Aug. 19.

CORRESPONDENCE.

[*We are not responsible for the opinions expressed by correspondents.*]

The Hastings Carburation Process.

Sir,—I naturally welcome any contribution from Mr. W. Young on the naphthalene question, however I may on some points disagree with him; but with reference to his letter on the above process in your last issue, I really feel that it is quite useless entering into any discussion on the matter while he ignores important details. Thus, for instance, it has been repeatedly pointed out, both by my senior and myself, that the carburation process was invented and *successfully used* here before the actual introduction of carburetted water gas. Further, last autumn (water gas being then in use) we endeavoured to dispense with the carburation process, without success.

Mr. Young also draws from my paper on "The Practical Working of Carburetted Water Gas" quite the reverse conclusion to the actual fact; for, surely, if any point was claimed, it was in regard to the *permanent character* of the water gas manufactured here.

Hastings, Aug. 24, 1899. Chas. F. Botley.

Water Consumption and Waste.

Sir,—Referring to the remarks upon the subject of "The Consumption of Water per Head in Different Towns," in your issue of the 8th inst., I should like to point out that, even in towns which are in every respect similar to each other, with the exception of the Local Authority's "Bye-Laws with Respect to New Streets and Buildings," the consumption of water will double itself.

One Local Authority will forbid the use of a disconnecting trap to the house-drain, for the reasons set forth by the Borough Engineer of Gloucester and many other Borough and Sanitary Engineers. When a stench-trap connected with the house-fittings becomes unsealed by the undue momentum of a syphonic flush, or for some other reason, a stream of sewer gas immediately finds its way into the house. The householder then opens a tap, and keeps it open, for the purpose of overcoming the smell. This, of course, is the cause of an extraordinary consumption of water, and the Water Engineer endeavours to convince the consumer that the water running from the tap does not in any way prevent the smell he complains of. But the consumer is not to be convinced, because he has found by experience that he does benefit by the water running, for the simple reason that the stream passing down the drain is the means of the air current going in the direction of the flow—*i.e.*, towards the sewer instead of towards the house.

Another authority will insist upon a disconnecting trap being fixed to every drain, and a mica or aluminium flap attached to the air-inlet. The air pent up by these flaps is an additional means of unsealing stench-traps, with the consequent undue consumption of water. Another authority will be greatly in favour of waste-water w.c.'s, and order their Inspector of Nuisances to instruct householders to put plenty of water down the drains.

In event of the British Association of Water-Works Engineers collecting returns for their members, I would submit that the returns should show whether the "Model Bye-Laws" (38 & 39 Vict., cap. 55) with respect to drainage are complied with.

Aug. 25, 1899. Student.

Sir,—"Waste Inspector" has misunderstood the article by "Distributing Engineer" which appeared in the "Journal" for the 8th inst., or he could not say that he has made "disparaging remarks anent the inspector." I did not myself get this impression from the article. We all know that the value of an experienced waste inspector cannot be over-estimated. As regards the visits made from house to house, and the Company keeping all taps in repair, there is no doubt the system is a wise one, and also a great preventive of waste where it has been adopted. There is very little doubt that with this system the inspector has a better opportunity of knowing what water is used for garden purposes, &c., and readily discovers any new fittings fixed since his last visit; and the discovery of these alone will pay his salary.

At the last conference of the Institution of Civil Engineers, during the discussion on a paper read by Mr. James Watson, it was stated by Mr. R. Askwith, of the Weardale and District Water Company, that the Company undertook to keep the taps in repair, and renew them when necessary, for 1s. per annum; and by this arrangement they now dealt with nearly 21,000 taps. This gave them an income of £1000 a year, and enabled them to keep a staff of plumbers going from house to house like postmen. To this he attributed the lowness of the consumption. As to the duties of the waste-water inspector, they should be similar, whether waste-meters are used or not; and if a perfect system of night inspection is carried out, these meters are not necessary. In my own case, we test all supplies precisely in the same manner as "Waste Inspector;" for he has to discover by the stethoscope where the leak is situated, after he has obtained a diagram of the district.

As a waste inspector, I object to being credited with an approximate quantity of water when accurate meters may be used to ascertain the exact amount distributed. With reference to the remark as to it being the duty of the engineer to educate the waste inspector, I think the inspector should educate and raise himself to an efficient standard, and be capable of showing why the output gauged approximately is more necessary than the accurate output gauged by a Venturi tube.

Aug. 26, 1899. Another Inspector.

The Yeovil Gas-Works Purchase.—In connection with the purchase of the gas-works, it was recently reported to the Yeovil Town Council that the stock taken over from the Gas Company was valued at £1263. The Gas Committee stated that the make of gas from June 30 (the date of the transfer) to July 26 showed an increase of 175,000 cubic feet as compared with the same period last year. The Town Clerk informed the Council that, in accordance with the advice of the Parliamentary Committee, he purchased a number of shares in the Company prior to the transfer of the works; and the Corporation would benefit by this to the extent of £1300 or £1400.

MISCELLANEOUS NEWS.

SHEFFIELD UNITED GAS COMPANY.

The Half-Yearly Report and Accounts.

On the occasion of the 89th ordinary general meeting of the above-named Company on the 12th prox., the Directors will report a very large increase in the Company's business in the six months ending the 30th of June. This they attribute to the active state of trade in the town and the low price of gas. The total quantity sold in the above-named period was 1,235,469,000 cubic feet; being 130,084,000 cubic feet, or 11·76 per cent., more than in the corresponding half of 1898. The receipts from the sale of gas came to £107,280—£101,063 from private consumers, and £6217 from the public lighting. The increased receipts from gas amount to £5685, although for the first three months of 1898 the prices per 1000 cubic feet were 2s., 1s. 10d., and 1s. 8d., as against 1s. 10d., 1s. 8d., and 1s. 6d. charged during the whole of the past half year. The returns from residuals amounted to £51,294; and the total revenue was £166,601. The expenditure on the manufacture of gas was £96,822 (coals costing £50,495); on distribution, £12,590; and on management, £5327—the total expenses being £124,824. The balance carried to the net revenue account is £41,777; and the amount available for distribution is £60,491. The Directors recommend the payment of the usual dividends, after which £468 will be added to the surplus profits—making the amount to be carried forward £18,452. The portions of the accounts relating to the manufacturing operations of the Company show that 101,974 tons of coal and 24,431 tons of cannel were carbonized during the past half year; the estimated quantities of residuals produced being: Coke and breeze, 76,948 tons; tar, 7856 tons; and ammoniacal liquor, 4,269,800 gallons.

TOTTENHAM AND EDMONTON GAS COMPANY.

Mr. Woodall on the Apportionment of Expenditure on Works and other Present-Day Topics.

The Ordinary General Meeting of this Company was held last Saturday, at the Offices, Willoughby Lane, Tottenham—Mr. CORBET WOODALL in the chair.

The SECRETARY (Mr. James Randall) read the notice convening the meeting, and also the minutes of the preceding meeting. The report (which was taken as read) stated that the quantity of gas sold showed an increase of 22,038,800 cubic feet over the first half of 1898 (equal to 10·52 per cent.). The total number of meters in use at midsummer was 14,993, of which 7425 were ordinary, and 7568 automatic; the increase, compared with the corresponding date of 1898, being 753 ordinary, and 1122 automatic meters. The number of gas cooking-stoves fixed and on rental was 2581, being an increase of 447. The number of public lamps was 2520; 1300 of these being lighted with incandescent burners. The profit and loss account (net revenue) showed with the undivided amount of £1734 brought from last year's account an available balance of £10,622, from which the Directors recommended that dividends at the rate of 6 per cent. per annum be declared on the "A" consolidated stock, and at the rate of 4½ per cent. on the "B" stock. This will absorb £8929, leaving £1693 to be carried forward.

The CHAIRMAN, in moving the adoption of the Directors' report and the accounts, said he was reminded, by the reading of the minutes, of the fact that he was not present at the last meeting of the proprietors, and that his place was occupied by the late Deputy-Chairman (Sir Henry E. Cartwright). As they were aware, since that date they had lost Sir Henry; and the Board had had to fill his place by the appointment of another Director. Sir Henry Cartwright was connected with the Company for a great many years; and he was a Director some twelve years. During that time, he proved himself to be a singularly intelligent and useful Director; and, even before then, he was always most intelligently and actively interested in the affairs of the Company. He (the Chairman) had known him—he was afraid to say how long, but certainly for twenty years; and during the whole of that period it had been in connection with the affairs of the Company. His loss they regretted very greatly indeed; and they hoped his successor would prove a man worthy of Sir Henry. Turning to the report, he must first say that, on the whole, he regarded it as satisfactory. It recorded a continued and large increase in the demand for gas—an increase which had been contributed to by every department of the Company's business. The supply had been well maintained; and both the quantity and the quality of the gas during the half year had been beyond reproach. During the six months, they had fitted up mechanical apparatus for the charging and discharging of the retorts; and this work had involved a very considerable amount of alteration in the retort-house itself. One-half of the retort-bench had been entirely reconstructed; and the new retorts were now heated with furnaces of an improved and more economical type. The second half of the bench would, almost certainly, be rebuilt in the course of next year. These alterations had involved considerable expenditure. For instance, the walls and roof of the retort-house had been raised between 5 and 6 feet, and a charging-stage had been introduced into it. The total cost of these improvements had been about £11,000; and of this sum £5130 had gone to capital, and the whole of the remainder had been charged against revenue. It was for this reason that the charges for repairs and maintenance were particularly heavy; and, added to the enhanced cost of materials, they had an explanation of the fact that the balance of profit was not larger than it was. They had earned £10,015; and charges for interest and dividend required £10,075; so that they had to draw £60 from their floating balance. This, on the first view, was disappointing, and certainly called for a few words of explanation. The increased sale of gas had been above 10 per cent. If this rate was maintained, the output would double in seven years, and necessarily the works and plant must be doubled also. Incidentally, he might remark that exception was taken, when the Company were before Parliament last year, to the so-called large amount of capital they were asking permission to raise. It was said, and was often argued under similar conditions, "If your present capital (in this case £400,000) has lasted you for seventy years, how can you need £300,000 in the next twelve years?" This was the argument one very often heard in Parliamentary Committees. But, as a matter of fact, the gas industry, as they knew it, was one of comparatively modern development; and its great increase had been within the lifetime of those who were still actively engaged in it. This, however, was a digression. He was saying that the output of gas promised to double in seven years; and as now capital was cheap, and present methods of manufacture more economical than those they replaced, it followed that there should be a larger margin of profit on new than on old business. And this was so on the whole; but there were two qualifications, which he would name: First, capital was much cheaper, but they needed more of it for a given amount of business; and, secondly, the rapid development of the demand could not always be met by adding section by section to the works. The demand causing this rapid growth involved the displacement of old apparatus and buildings, and their replacement by larger—and this before the old had worn out. It had to be replaced simply because it was too small; larger units of plant being more economical than the old smaller ones. These changes must, to a very large extent, be borne out of revenue; and while they were in progress, profits were necessarily reduced. Few matters in gas management required more care than this apportionment of expenditure. It was easy to find capital; and for the moment it was agreeable to pay £4 of interest rather than £100 of principal. But a habit of this sort was not honest; it passed on burdens to the future which should be borne by the present, and would bear fruit of a disastrous character. This was a course they would avoid at any cost; and although an earlier reduction in the price of gas might be secured by the course he had condemned, it would only be at the expense of a permanently higher price in the future. Another matter which had occupied the Board during the half year had been the securing of a site for new offices. He had no doubt there were proprietors present who remembered when the offices in which they were assembled were built. It was twenty years ago; and then exception was taken to them being inconveniently placed with regard to the district of supply. They had served their purpose for twenty years. Now they were too small; and instead of extending them, the Board had determined to erect suitable offices in the High Road of Tottenham. They had obtained an admirable site; and thereon they intended to build premises in which both the clerical and distribution work could be carried on. This would aid the business of the Company very materially, and would be a great convenience to the consumers; and the economy which would be effected would be sufficient to cover the interest upon the expenditure which would be necessary. He had no more to say with regard to the working of the Company; but there were two events of interest to them as members of the great gas industry which had happened since they last met, and which called for a few words of explanation. The Departmental Committee appointed to consider the question of the supply of carburetted water gas had reported in favour of limiting the percentage of carbon monoxide which might be allowed in the mixed gas supplied to the consumers. No action had yet been taken upon their report; and as the conclusions arrived at seemed in conflict with the evidence, they might hope that no serious interference would result. There was another question of great interest to the gas industry as a whole, though arising out of an inquiry as to the administration of the London Gas Companies only, upon which he had intended to address the proprietors. But much as he deplored some of the conclusions of the recent Committee, he would confine himself now to saying that, if they were all adopted—as they would not be—he knew no Company less likely to be affected prejudicially by them than their own. Upon this matter, he preferred to say no more that day.

The DEPUTY-CHAIRMAN (Mr. D. Ford Goddard, M.P.), in seconding the motion, said he might say a few words with regard to the very prosperous half year through which they had just passed; prosperous at least in regard to the enormous—he thought he might say abnormal—increase of business. He supposed at first glance, as proprietors in the undertaking, they would all say there could be nothing better than to have this enormous increase in their business. But this did not always follow as a natural consequence. It must be borne in mind that, when they had these tremendous increases of business, they caused great anxiety to the officials. It was utterly impossible in an undertaking like a gas-works to foresee these large increases in consumption; and therefore, of course, the plant was not always exactly what they would have had if they could have foreseen them. It was put upon the officials to supply not only larger quantities of gas, but to maintain at the same time a good quality. This was one phase of these increases which must not be lost sight of. The second point was this, that, when they had these increases, they were obliged to force the work, and even had to do it at a greater expense than if the advance had gone on gradually. This was the position in which they had lately found themselves. They had had these enormous increases, and their property was not exactly proportional to them; they had come so suddenly, that the expense had been larger to meet them than would otherwise have been the case. Referring to the establishment of offices in the town, he said it would keep them more in touch with the consumers. The district was growing with (he might say) alarming rapidity; there seemed to be no end to the building enterprise in a place like this. The first thing a gas company had to do was to see that they had sufficient gas for all who wished to take it; the second thing was to see that the gas sent out was of such purity and quality that nobody could find fault with it; and the third was to keep closely in touch with the consumers, so that any complaint that might arise could be met in the most easy way. This was the main object of establishing the town offices. At the first glance, it might strike the proprietors that a large amount of money was going to be spent on the offices; but those who had had experience of gas undertakings where they had attempted to bring the office work in closer touch with the consumers would not have two opinions as to the desirability of this expenditure.

The CHAIRMAN, replying to a question as to the cost of the new offices, said that probably, with land, cottages, and offices, they would spend about £12,000. Continuing, he remarked that he was much struck with the Deputy-Chairman's observations in which he gave three *raisons d'être* for the existence and carrying on of a gas company. Every one of them, however, had to do with the consumers; and he forgot altogether to make reference to the shareholders. Perhaps he did not forget them. At any rate, he (the Chairman) was glad he put at the forefront the question of the satisfactory supply of the district and consumers,

which was the first and strongest reason for the existence of a gas company. If incidentally they could manage to make a satisfactory return to the shareholders, well and good; but their first duty was not the making of good dividends, but the giving of a good supply of gas to the consumers.

The motion was unanimously carried.

On the proposition of Mr. JAMES WARREN, seconded by Mr. GERALD T. WATSON, dividends were declared on the "A" consolidated stock at the rate of 6 per cent. per annum, and on the "B" consolidated stock at the rate of 4½ per cent.

The CHAIRMAN, in proposing the re-election of Mr. Warren to his seat at the Board, remarked that he was the oldest surviving Director of the Company. It made one sad after reaching middle life, in looking round any association of men, to find how quickly it changed. During the time he (the Chairman) had been a Director of the Company (not very long, it seemed to him), nearly the whole of the members had been changed, and one or two of the seats had been occupied twice. He hoped Mr. Warren would live for many years to serve the Company.

Mr. LANG seconded the motion, which was unanimously carried.

On the motion of the DEPUTY-CHAIRMAN, seconded by Mr. E. CROWNE, Mr. Watson, the new Director, was also re-elected.

The appointment of Auditors next occupied considerable attention. The retiring Auditor was Mr. A. H. Baynes; and his re-election was proposed by Mr. J. N. PIKE, seconded by Mr. ALFRED KITT. But Mr. Baynes has not been so regularly in attendance at the meetings as some of the proprietors would have liked; and, in consequence, Mr. CORBOLD moved as an amendment, and Mr. LANG seconded, that Mr. Crowne be appointed in his stead. Mr. Crowne is the Clerk to the District Council; and his name is a sort of household word in Tottenham. Owing to Mr. Watson's elevation to the Board, he audited, in conjunction with Mr. Baynes, the accounts for the past half year. The efficient manner in which he did this was acknowledged by the Chairman. At the same time, he said it was only fair to Mr. Baynes to say that, so far as the Directors were informed, there had been no failure on his part to perform the duties of his office; and he was not aware of any reason why the Auditors should both be present at the meetings of the shareholders. On the amendment being put, thirteen voted for it, and eight against. Mr. Kitt thereupon demanded a poll; and, after some conversation, the Chairman declared that it should be held that day three weeks.

To fill the position in the auditorship vacated by Mr. Watson, Mr. LANG moved, and Mr. KITT seconded, that Mr. J. L. Chapman be appointed. In view of the poll being demanded on the previous election, Mr. Corbold put forward a counter-motion that Mr. Crowne be appointed to the vacancy; but the Chairman ruled this out of order. The point provoked further discussion, which ended by Mr. Crowne withdrawing himself from opposition to Mr. Chapman, who was thereupon elected. Early in the discussion, Mr. Crowne explained that it was for this position that he had offered himself; and, before entering the room, he had no idea that he was to be put forward in opposition to Mr. Baynes.

It was subsequently decided that a letter should be forwarded to the family of the late Sir Henry Cartwright expressing the sympathy of the proprietors with them in their bereavement.

A vote of thanks to the Chairman and Directors and officials terminated the proceedings.

BARNET DISTRICT GAS AND WATER COMPANY.

The Half-Yearly Meeting of this Company was held last Friday, at the Albion Tavern, Aldersgate Street, E.C.—Mr. JAMES GLAISHER, F.R.S., in the chair.

The SECRETARY (Mr. Ernest W. Drew) read the notice convening the meeting; and the report and accounts were then presented.

The CHAIRMAN said the balance-sheet gave a great deal of information; but perhaps he might add a few more details by way of comparison. Speaking first of the gas undertaking, he said the quantity of coal carbonized in the six months was 4160 tons, which was 343 tons more than in the corresponding half of last year. The gas made amounted to 45,631,000 cubic feet; being at the rate of 10,969 feet per ton of coal carbonized. He thought everyone present would agree with him that this was capital working, and was a credit to their Engineer (Mr. T. H. Martin), and indeed to all engaged in the carbonizing work. The amount of gas unaccounted for was 3,497,000 cubic feet; being rather more than 7½ per cent. of the quantity made. The gas sold was 41,449,000 cubic feet; and they therefore received money for very nearly 10,000 cubic feet for every ton of coal carbonized. The amount of coke made was 3962 chaldrons, or 34 bushels per ton of coal; and they sold 3074 chaldrons at 10s. per chaldron, and used in the manufacture 892 chaldrons. The tar made was 47,840 gallons; being 11½ gallons per ton of coal, which was very good indeed. They disposed of 47,130 gallons, at 1d. per gallon. The sulphate of ammonia produced was rather more than 42 tons; and as they carbonized less than 4200 tons of coal, the yield of sulphate was equal to 1 ton per 100 tons of coal. Turning to the accounts of the gas undertaking, it would be seen that coal had cost £355 more. There was nothing particular in the other items of manufacture, except that they had kept well up the repairs and maintenance of works. Having mentioned small differences under other heads of expenditure, he said the total outlay was £6928; and in the corresponding period of 1898 it was £745 less. On the other side of the account, the private and public lighting had increased by £571; and the residual products were £412 more. Both these items were good. The total gas revenue was £10,379, while in the first half of last year it was £9371; so that they had had an increase of £1007. The profit for the half year was £3450, which was an increase of £262. Under all the circumstances, this was good. Dealing with the affairs of the water undertaking, he reminded the shareholders of the dry and hot summer of last year, and of the prospect he then held out of the likelihood of the Company having the East Barnet well in operation by this time. But in sinking that well, they had encountered more difficulties than they had anticipated. They came across very hard chalk; and some of the tools which they used in the work were actually broken. These difficulties considerably interrupted the work, and caused great disappointment to both the Engineer and the Directors. Then came the hot weather this year; and while he would not deny the inhabitants a little water for their thirsty plants and vegetation, he had to complain of their lavish expenditure for that purpose. He feared it was this terrible expenditure of water on so many gardens that caused difficulty. The Company were placed, at the beginning of June, in a difficult position. They had not then the Barnet water in full supply; and therefore they made arrangements with the New River Company for a temporary supply. But, in order that the domestic service should not be interfered with, they gave notice to the Local Authorities that they could not supply water for road purposes. Unfortunately, from this notice it was feared there would be a water famine. A deputation from one of the authorities waited upon the Directors, who told them the actual state of things. Apparently, these gentlemen did not believe them; for the first sentence in their report was: "We have not the slightest confidence in the Company's figures as to the output;" and they closed with the words: "The New Barnet well cannot be producing anything approaching a million gallons of water a day, as stated by the Company; and, in our opinion, it is probably not furnishing more than half a million." He thought he told the deputation the truth. This he knew—he told them facts; and facts were stubborn things. Shortly afterwards, a connection was made with the East Barnet well; and they had now from that source about 600,000 gallons per day. Directly they could get any source to supply the whole district (he meant to supply it well), they would proceed to do work at the Barnet well proper. They had hesitated to take it in hand until they could do so without sending chalky water into the mains. The season had been a difficult one. They had had periods of 20 days, 19 days, and 10 days without rain in the last three months; and, in fact, if he compared the rainfall at Greenwich (where they had records for 84 years), they had only had 4·2 inches, whereas they ought to have had, on an average, an additional 4·6 inches, so that they had not had half. From the beginning of the month to that day, they had only had 0·1 inch of rain, which availed nobody, not even vegetation. On July 15, the Directors gave notice that the roads could be again watered. The whole district had since been well supplied with water, and there had been no limit. The shareholders might therefore be perfectly sure the Directors had the thing well in hand. Regarding the water accounts, he pointed out that the pumping and engine charges at Potter's Bar exceeded £2000, which was £1400 more than in the corresponding half of 1898. On the other side of the account, they had a revenue of £10,796, which was £383 more. Thus, on whichever side of their business they looked, they were progressing well. But comparing the profit on the water undertaking, in the June half of last year it was £6797, and this year only £5527, which was £1270 less. The Board, however, considered that the additional cost of pumping (£1400) was only a temporary matter; and directly they got their own engines at work, they would come to their normal state. The business was proceeding so satisfactorily that the £684 they required to pay the dividend could be taken out of the undivided balance of profits. He concluded by moving the adoption of the report and accounts.

Mr. CHARLES HORSLEY, J.P., seconded the motion, which was unanimously carried.

On the proposition of Mr. HORSLEY, seconded by Dr. J. W. L. GLAISHER, dividends were declared at the rates of 9 per cent. per annum on the "A" and "C" stocks, 8 per cent. on the "B" stock, and £6 6s. per cent. on the "D" capital.

A hearty vote of thanks to the officials having been passed,

The CHAIRMAN remarked that one familiar face was unfortunately absent that day. He referred to Mr. Alfred Lass, than whom no one had taken a deeper interest in the prosperity of the concern. As the shareholders were aware, he had failed in health. On his retirement from the Secretaryship he was elected a Director of the Board. The previous week he wrote to him (the Chairman) expressing the hope that he would be present that day. He was not there; and therefore they feared his illness continued. He asked the sympathy of the shareholders with one so faithful as Mr. Lass had been to them, in the affliction from which he was suffering. (Hear, hear.) Mr. Drew, one of Mr. Lass's partners, had been elected to fill his place. It was intended to fix his remuneration that day; but they were not sufficiently numerous. In the same way they would have to defer consideration of the proposed conversion into "D" capital water stock of 3792 fully paid-up "D" water shares of £10 each.

A cordial vote of thanks to the Chairman and Directors concluded the proceedings.

PROVINCIAL GAS AND WATER COMPANIES.

Gas.

In presenting the annual report at the recent meeting of the Aldershot Gas and Water Company, the Chairman (Mr. A. F. Wilson) said there was every reason to congratulate themselves upon it, for, notwithstanding the reductions which had been made, and in spite of drawbacks, they had been able to maintain their dividend. There were two or three things which cropped up unexpectedly. For instance, the rates and taxes had gone up to £729, an increase of £229; they had written £150 off their penny-in-the-slot meter account, for depreciation; and the reduction in the price of gas, together with the lower charge upon the water contract account, brought up the total loss of revenue to about £1250. It had been a non-eventful half year; and there had been no meeting in his experience at which they had so little to say. Though they had had a great deal of work to do, they had got to the end of it; and at the present time they had no new work in hand. The general tendency had been in the direction of economy, with satisfactory results. Both the water and gas works were in good condition, and the Company were increasing their revenue from the consumption of gas. He concluded by moving the adoption of the report; and the motion was carried.

At the meeting of the Ascot District Gas Company yesterday, the accounts for the half year ending June 30 showed a profit of £1054; the revenue being £2798, and the expenditure £1744. After providing for every charge against the half-year's working, there was a balance of £1538 at the credit of the profit and loss account, out of which the Directors recommended a dividend at the rate of 4 per cent. per annum. This would absorb £810, and leave a balance of £728 to be carried forward. The revenue in the half year had increased to the extent of 16¼ per cent., as compared with the corresponding period of 1898; and the business of the Company is progressing satisfactorily.

At the half-yearly meeting of the Brighton and Hove General Gas Company on the 8th prox., the Directors will report an increase of nearly 7 per cent. in the quantity of gas sold in the six months ending June 30, largely due to the growing demand for cooking and heating purposes. There was also an additional revenue from the sale of residual products; but manufacturing wages were much higher, owing to the adoption of the eight-hour day. The total receipts were £92,540; and the expenditure was £66,048—leaving a balance of £26,492. The sum standing to the credit of the profit and loss account is £29,679; and the Directors recommend that dividends for the half year be declared at the rate of 11½ per cent. per annum on the original ordinary consolidated stock, 8½ per cent. per annum on the "A" stock, and 6 per cent. per annum on the "B" preference stock. For the payment of these dividends £23,768 will be required; leaving a balance of £5911 to be carried forward. Under the supervision of Mr. Joseph Cash, 36,773 tons of coal and 373,237 gallons of enriching oils were used in the production of gas; and of the total amount made, 511,584,200 cubic feet were sold for public and private lighting. The estimated quantities of residuals were: Coke, 22,547 tons; breeze, 2198 tons; tar, 486,183 gallons; and ammoniacal liquor, 817,507 gallons.

At the meeting of the Colney Hatch Gas Company last Thursday, the Directors announced the continued growth of the business. In the six months ending June 30, there was an increase equal to 6·19 per cent. on the sale of gas; and the prices realized for residuals more than maintained the improvement referred to in the previous report. The sale of 32,653,400 cubic feet of gas for public and private lighting produced £6258; residuals brought in £1335; and the total revenue was £8182. The expenditure being £5710, there was a balance of £2472 to go to the profit and loss account. The sum available for distribution was £4722; and the Directors recommended the declaration of dividends at the rates of 10, 7, and 5 per cent. per annum on the original, additional, and preference shares—leaving £2917 to be carried forward.

The 61st ordinary general meeting of the Cork Gas Consumers' Company will be held next Tuesday, when the accounts to be presented will show a small decrease in the rental, in the six months ending June 30, as compared with the corresponding half of 1898, but an increase over those of 1897 and preceding years. The Directors explain that the weather in the early part of last year was very dark and gloomy, which accounted for the abnormally high consumption. The extra cost of coals is counterbalanced by a marked improvement in the receipts for residuals. Some of the items of expenditure are higher; but it is expected that this outlay will produce satisfactory results. The new plant recently erected has improved the quality of the gas; and this with the modern retort-settings which have been contracted for will, the Directors state, lead to economy in manufacture. The revenue amounted to £25,891; the expenditure, to £19,561—leaving a balance of £6330. The balance on the profit and loss account is £5171; and in order to pay the usual dividend it will be necessary to take £481 from the reserve fund. The Resident Engineer (Mr. T. P. Travers) reports that the general plant has been maintained in good working order. The tar extractor and new washer have now been at work for some time, and analyses show a considerable improvement in the purity of the gas. Work has been commenced on the new retort-house, in which are to be installed the retorts to replace those worn out in the old works. He points out that when this is completed, the production of gas can be carried on more satisfactorily and economically than is possible with the system of retorts and retort-houses now used.

At the meeting of the Dover Gas Company on Monday, the 4th prox., the Directors will report an increase of about 9 per cent. in the quantity of gas sold, as compared with the corresponding period of last year, and also an improvement in the value of residuals. The advance in the price of coals, however, more than absorbs the extra profit from these sources. The sale of gas produced £12,703; coke, tar, and other residuals brought in £4112; meter and stove rentals, £754; and the total revenue was £17,914. The expenditure being £15,424, there is a balance of £2490. A sum of £6010 is available for distribution; and the Directors recommend the declaration of the usual dividend at the rate of 7½ per cent. per annum, less income-tax. After carefully studying the question of prepayment meters, and noting the mode and results of their use in other towns, the Directors have decided to adopt and supply on hire shilling-in-the-slot meters, with necessary fittings, upon terms which they consider beneficial to the Company and fair to the consumers.

The half-yearly accounts of the Heckmondwike Gas Company show a profit of £1471 to add to a balance of £3755. Deducting interest and the interim dividend, leaves in hand £3937, which allowed the declaration, at the meeting last Wednesday, of the full maximum dividends. After paying these, a sum of £2177 will remain to be carried forward.

The report presented at the annual meeting of the Kidsgrove Gas Company opened with an announcement of the completion of the renewal of the works. Bearing upon this matter, it was also mentioned that the capital account had been increased by a call of £1 per share on 1076 new shares, and now stood at £16,753; leaving a balance of £3238 uncalled. The revenue account indicated a reduced expenditure, and the sale of gas showed an average increase; having reached 20 million cubic feet. The rise in the price of coal, however, had proved a serious matter, and had put off for the present a much-desired reduction in the charge for gas. As a small set-off to the advance in coal, it was expected that coke and other products would realize higher prices. The Chairman (Mr. J. Gater), in proposing the adoption of the report, said he was pleased to be able to congratulate the shareholders on the continued prosperity of the undertaking. The Directors were glad to find the accounts came out so well, as the undertaking had been saddled with an advance in the price of coal and other additional expenses. The report was adopted.

The half-yearly meeting of the Mirfield Gas Company was held at Ravensthorpe last Friday—Mr. John Tweedale (Dewsbury) presiding. The report and accounts, which were adopted, showed that the profit for the half year amounted to £2262; making £3401 available for distribution. Dividends of 10 per cent. on the old and 7 per cent. on the new shares were declared; £1076 being carried forward.

At the 21st annual meeting of the Morecambe Gas and Light Company next Thursday, the Directors will express their pleasure at being able to report a continued increase during the year ending June 30 in the revenue from the sale of gas, which was a net sum of £11,129, of which £2594 was for gas used for cooking and heating purposes. The total receipts were £13,842; and the total expenditure was £8359—leaving a balance of £5483. The sum available for distribution is £4130; and the Directors recommend the payment of a dividend of 8 per cent. for the half year—making 14 per cent. for the year. The District Council of Morecambe having announced their intention to promote a Bill for the compulsory purchase of the Company's undertaking, the Directors felt it their duty to consider whether terms of purchase could not be arranged satisfactory to the Council and remunerative to the shareholders. The result of negotiations was an agreement for sale, which was considered by a special meeting of the shareholders on the 23rd of June, and unanimously approved. The Council will therefore promote a Bill next session to effect a purchase on the terms of the agreement, and if an Act is obtained, the business will be sold as and from June 30, 1900. Under the supervision of Mr. W. Duff, the works carbonized 7028 tons of coal and 24 tons of cannel last year; the make of gas being 71,256,000 cubic feet, of which 68,030,225 cubic feet were sold and 68,742,785 cubic feet accounted for. The estimated quantities of residuals produced were: Coke, 4407 tons; tar, 77,023 gallons; and ammoniacal liquor, 112,911 gallons—the make of sulphate being 20 tons 12½ cwt.

A gratifying improvement continues to mark the business of the Normanton Gas Company. The profits for the past half year amounted to £1179; and the sum available was £3136, out of which the Directors recommended the payment of a dividend of 5½ per cent. for the six months. After meeting this a balance of £2036 will remain. At the meeting last Saturday week, the Chairman (Mr. E. Mitchell) informed the stockholders that the cost and cartage of coal had increased by £162; but they had sold more gas both through ordinary and prepayment meters, and the receipts from residual products had also increased. The Directors were now entering into contracts with regard to the residual products which would bring in even a larger amount; and they hoped in the coming half year to be able by this means to counterbalance the advance in the price of coal. By overhauling the meters and other means, they had succeeded in reducing the leakage of gas from above 20 per cent. to 18 per cent. The report was adopted.

The shareholders of the Pontefract Gas Company held their half-yearly meeting on the 18th inst.—the Mayor of Pontefract (Mr. J. Taylor) presiding. He stated that the amount available for distribution was £1445; and the Directors recommended dividends at the rate of 10 per cent. on the original shares and 7 per cent. on the new ordinary shares. The reserve fund now amounts to £2647. The report was adopted, and the payment of the dividends sanctioned.

The half-yearly meeting of the Portsea Island Gas Company was held on the 19th inst.—Alderman Sir John Baker, J.P., M.P., in the chair. The accounts for the six months ended June 30 showed an available balance of £34,771 (exclusive of the balance standing to the credit of the extraordinary renewals account), which enabled the Directors to propose the payment of dividends at the rate of 13 per cent. per annum on the "A" and "B" shares, 12 per cent. per annum on the "C" shares, and 5 per cent. per annum on the stock (all less income-tax), and to place a further sum of £1000 to the insurance fund; leaving a balance of £21,578 to be carried forward. The recommendations of Mr. Alfred Colson with regard to the works, referred to in the report for the first half of last year, had been adopted, and the alterations suggested were approaching completion. The revenue account showed that the expenditure for the half year had been £44,825, as against £43,264 in the corresponding period of 1898; the receipts, £59,080, compared with £54,573; and the balance carried to the profit and loss account, £14,254, against £11,309. The residual products realized £12,214. The coal and cannel used amounted to 35,978 tons and 1933 tons respectively; and the quantity of gas made was 404,277,000 cubic feet, of which 371,983,200 cubic feet were sold and 375,012,400 cubic feet accounted for. The report and accounts were unanimously adopted.

At the half-yearly meeting of the Riddings District Gas Company last Friday, at the London Offices, under the presidency of Mr. Chas. Horsley, the accounts for the six months ending June 30 showed receipts to the amount of £1988, and an expenditure of £1237; leaving a balance of £751. The amount available for distribution was £2245; and a dividend at the rate of 6 per cent. per annum was declared.

Mr. George Fullford presided at the annual meeting of the Salisbury Gas Company; and in moving the adoption of the report and the payment of dividends ranging from 5 to 10 per cent. per annum, he said the sales of gas and residual products had been well maintained, and showep a good increase on the year. He congratulated the shareholders on the continued prosperity of the undertaking. The price of coal showed a tendency to increase; but, on the other hand, they had done better with coke and sulphate of ammonia. The improvements in street lighting had necessitated some extra expense. Not only were there new lanterns and burners to be provided, but many of the original standards had to be re-arranged. Salisbury was the pioneer town as regarded the new Welsbach system of street lighting; and it was satisfactory to notice that the system was now very largely adopted. Only the previous week, the Birmingham authorities had decided to introduce it. The receipts for rent of stoves and apparatus had increased, and also, to a slight extent, the expenditure under that head. They now undertook the maintenance of incandescent burners, including the renewal of mantles, for a low charge per quarter. The number of consumers continued to increase; there being a brisk demand for prepayment meters. The motion was unanimously carried. At the conclusion of the ordinary business, a special meeting was held, at which the Directors were authorized to issue £4000 of additional capital in 5 per cent. preference shares. The Chairman explained that the demand for new mains, services, and slot meters had exhausted the present capital resources.

The net revenue of the Scarborough Gas Company for the half year ending June 30, including £2110 brought forward, was £6473; and at the ordinary general meeting of the Company on the 19th inst., the Directors recommended, after providing for dividends on the preference stock, the payment of the maximum dividends on the ordinary stocks, all less income-tax. This would absorb £6099, and leave a balance of £374 to be carried forward. The Directors reported a large advance in the price of coal under the new contracts commencing on the 1st ult. But better prices were being obtained for coke and other residual products; and a hope was expressed that this might compensate for the increased cost of coal. The extensions of the manufacturing plant which

have been in progress are now practically complete, and giving satisfactory working results. Under the supervision of Mr. J. Holliday, the Company's Engineer and Secretary, 10,422 tons of coal and 154 tons of cannel were carbonized in the half year; 103,271,500 cubic feet of gas being sold for private consumption and 9,520,600 cubic feet for public lighting. The estimated quantities of residuals produced were: Coke, 6346 tons; tar, 691 tons; and ammoniacal liquor, 1082 tons.

The report of the Sunderland Gas Company states that the total revenue in the year ending June 30 was £105,211, and the expenditure £89,686; leaving a balance of £15,525. The rise in the price of coals and other materials caused an increased expenditure of £14,753, which was partially covered by an additional revenue of £13,099 from gas and residuals. An interim dividend was paid in March last; and the Directors recommend a similar dividend of 5 per cent. on the original stock, and of 4½ per cent. on the additional capital stock. The Secretary and Manager (Mr. J. H. Cox) having reached his jubilee with the Company, the Directors recommend that about 100 guineas be devoted to a suitable recognition of his services.

Although there were no detailed accounts to lay before the shareholders at the recent half-yearly meeting of the Tunbridge Wells Gas Company—it not being customary to present them until the annual meeting—the Chairman (Mr. Delves) was in a position to announce that the results of the six months' trading had been highly satisfactory. There had, he said, been a considerable increase in the sale of gas. The rise in residuals would, he hoped, compensate to a considerable extent for the additional cost of coal; and in the current half year they should have the benefit of a further advance in tar. The extra amount of coal carbonized was 210 tons, and the cost had been £1400 more; so that, while the quantity used had increased by 2 per cent., the price had advanced by 18 per cent. The gas sold showed a satisfactory increase of about 9 million feet; and the increase in gas-rental was almost the same as the extra cost of coal. They had no reason to suppose that the cost of working was anything much in excess of the usual; and the Directors therefore felt justified in recommending the usual dividends. The only decrease, as might be expected, was in public lighting; and this was a little under 5 per cent. The prepayment meters showed a satisfactory increase, and now formed a respectable proportion of the total revenue of the Company. The report was adopted.

The half-yearly general meeting of the Wakefield Gas Company was held on Monday last week—Mr. W. A. Statter, J.P., in the chair. The accounts for the six months ending June 30 showed that the revenue from the sale of gas amounted to £13,420, and that the total receipts were £18,148. The expenditure being £11,932, there was a balance of £6216 to go to the profit and loss account. The sum applicable for distribution was £7459; and the Directors recommended the payment of the usual dividends—viz., 11½ per cent. per annum on 1000 £25 and on 3660 £5 shares; 9 per cent. per annum on the 7340 "B" 5ths £5 shares; and of 8½ per cent. per annum on the 2500 new ordinary fully paid £10 shares, and also on the new ordinary £10 shares on which £4 has been paid—all clear of income-tax. The Chairman, in moving the adoption of the report, said he thought he might congratulate the shareholders on the satisfactory balance-sheet. Coals had cost more; partly owing to the increased consumption, but more particularly to the advance in the price, which meant 3d. per 1000 cubic feet more than two years ago. The other items of expenditure were about the same as in the corresponding half year. On the other side of the account there was an additional amount received from the sale of gas and residual products. The continued increase in the consumption of gas (notwithstanding the competition of the Corporation electric light installation, of which the Company had felt the full effect for the first time during the past half year), had rendered some increase of carbonizing plant imperative; and the Directors had decided to adopt the system of inclined retorts, which it was hoped would produce practical results of much advantage to the Company. The Directors had also found it necessary to fix two new boilers, two pairs of 40,000 cubic feet per hour twin exhausters, a washer to pass 2 million cubic feet of gas per day, to adapt the various buildings to accommodate this apparatus, and to carry out a variety of other work. The Mayor of Wakefield (Alderman Roberts) seconded the motion; and it was carried. The dividends recommended having been declared, a cordial vote of thanks was passed to the Chairman, who, in acknowledging the compliment, referred to the extra labour and anxiety which had been incurred by the Engineer (Mr. H. Townsend) in preparing plans for the alterations. He concluded by proposing the usual vote of thanks to the staff, which was suitably acknowledged by Mr. Townsend and the Secretary (Mr. W. H. Parker).

On Tuesday, the shareholders of the Waterford Gas Company met, to receive the annual report. It disclosed the fact that the divisible balance on the profit and loss account was £2247, out of which the Directors recommended the payment of a dividend for the past half year equivalent to 5½ per cent. per annum on the consolidated stock (less income-tax), amounting to £1499, and leaving £747 to be carried forward. The Chairman (Mr. R. Hesketh Jones), in moving the adoption of the report, stated that the consumption of gas had increased about 3¾ per cent.; and the Directors were endeavouring to encourage the use of gas-stoves, by enabling consumers to obtain them on very easy terms. Since March, 30 cookers had been fixed as the result of the instruction given in the spring by persons skilled in this matter. The report was adopted.

The Weymouth Consumers' Gas Company held their half-yearly meeting on the 17th ult., when the Chairman (Mr. R. Thomas) moved the adoption of the Directors' report, noticed in the "JOURNAL" a fortnight ago. In doing so, he said he felt that it was very gratifying for the Directors to know that the progress of the works was continuous; and they could not see any reason in the future why it should not be maintained. They were most anxious to see the accomplishment of the alterations in hand, for the reason that they felt they would then be in a position to more economically work the concern, and thus be enabled in all probability to reduce the price of gas—in fact, he took it for granted this would be done. In addition, they would be extending a very great boon to the working population by supplying automatic meters; thus giving them the privileges and advantages now spread all over the kingdom, and so thoroughly appreciated. The Company were, however, unable at present—though they had many such meters in use—to push the trade largely because their present works were not capable of meeting the requirements. Coal was enhanced in price; but the Directors hoped, as sulphate of ammonia and coke had also advanced, that the latter would meet the increase on the coal. The motion was carried. A vote of thanks having been accorded to the Chairman and Directors, Mr. J. E. Robens acknowledged the compliment, and proposed a similar vote to the Secretary and Manager (Mr. J. Lowe), and to the other officers of the Company, for the efficient way in which they had discharged their duties. Mr. Lowe briefly replied; and the proceedings closed.

Water.

It was stated at the half-yearly meeting of the Hawarden Water Company last Saturday week, that the Directors were arranging for the construction of a new reservoir at a cost approximating £20,000. The balance available for dividend was £522, which admitted of the payment of a dividend at the rate of 3 per cent. per annum.

The accounts submitted at the annual meeting of the Lewes Water Company last Wednesday showed receipts amounting to £4068, and an expenditure of £1711; leaving £2357 available for dividends. Of this £1035 was distributed among the shareholders in February last. Dividends of 5, 3½, and 2½ per cent. on the several classes of capital have been declared for the past six months; making 10, 7, and 5 per cent. for the year. In addition, 15s. per share is to be paid to the holders of original shares in part payment of arrears due to them. The Chairman (Mr. Francis Verrall) was in the happy position of being able to point to a very satisfactory increase in the business.

At the half-yearly meeting of the Maidstone Water Company last Thursday—Mr. G. Marsham in the chair—the Directors reported that for the six months ending June 30 the water-rents amounted to £5457; being an increase of £452 over the corresponding half of 1898. There was a sum of £1857 to the credit of the profit and loss account; and the Directors recommended the payment of a dividend, free of income-tax, at the rate of £4 6s. 8d. per cent. per annum on the 10 per cent. shares, and of £3 1s. 8d. per cent. per annum on the 7 per cent. shares. These payments would absorb £977, and leave £880 to be carried forward. The Directors had been pumping water for domestic supply from the 3-inch borehole at the Forstal, Aylesford, since the 5th of June. The yield was about 170,000 gallons a day, and the supply was apparently limited only by the size of the hole, as, so far, the pumping had not caused any diminution in the quantity. The Directors were sinking at Forstal a permanent borehole 8 feet in diameter. In moving the adoption of the report, the Chairman remarked that the affairs of the Company were progressing satisfactorily. Of course, it was a matter of regret that the Directors had found it necessary to cut off the water at certain periods during the night; but they had done their best to make arrangements which would cause as little inconvenience as possible. The rainfall had been gradually decreasing since 1896; and while the Directors could not produce water if it was not there, they were taking steps to secure a larger and more constant supply. The water supplied by the Company had been analyzed by Dr. Sims Woodhead and by Dr. Gregory, and the result was as satisfactory as they could possibly wish. The report was adopted.

The Directors of the South Staffordshire Water Company will report to the shareholders, at their half-yearly meeting on Thursday, that the number of houses laid on in the six months ended the 30th of June was 2280, making the total supplied 101,482. The gross amount of water-rates for the half year was £51,408, against £48,557 in the corresponding period of the previous year. After providing for interest on debenture and preference stock, the amount remaining for division (including £6243 brought forward) is £26,537; and the Directors recommend the declaration of a dividend on the ordinary stock at the rate of 6 per cent. per annum, free of income-tax. The amount of this dividend being £17,850, there will remain £8687 to the credit of the current half year. The Company's Engineer (Mr. H. Ashton Hill) reports that the machinery, buildings, and plant are in substantial order and repair.

The half-yearly general meeting of the West Surrey Water Company was held at the offices, 38, Parliament Street, Westminster, last Tuesday—Mr. J. M'Millan in the chair. The Directors reported that the income in the six months ending June 30, after making provision for empty houses, irrecoverable rates, &c., amounted to £4609, and the expenditure to £1732. Comparing these amounts with those for the corresponding half of 1898, the income exhibited an increase of £471, and the expenditure a rise of £22. There were 2748 yards of cast-iron pipes, 3 inches in diameter, laid for the extension of the service-mains, and 219 new supplies connected; representing a future rental of £412 per annum. The Engineer and Manager (Mr. J. K. Hill) reported that the Company's mains and plant were in good order, and that the construction of the additional service reservoir at St. George's Hill was making satisfactory progress. The sum available for distribution was £3319, which the Directors recommended should be applied as follows: To the payment of dividends of 5 and 6 per cent. upon the preference shares, amounting to £537; and to the payment of a dividend at the rate of 6 per cent. per annum upon the ordinary shares, amounting to £1443—leaving a balance of £1339 to be carried forward. The report and accounts were approved and adopted, and the dividends recommended were declared.

The revenue account of the Whitby Water Company shows, subject to outstanding liabilities, a disposable balance of £1709; and the Directors recommend dividends for the past half year at the rates of 3½, 8, and £5 12s. per cent. per annum on the various classes of shares. These payments will absorb £1116, and leave a balance of £593 to be carried forward.

Incandescent Gas Lighting for Leeds.—A Sub-Committee of the Lighting Committee of the Leeds Corporation last Wednesday passed a resolution in favour of the substitution of incandescent lamps for ordinary gas-burners in many of the principal streets. It is estimated that, besides the better illumination afforded, there will be a slight saving. What required an expenditure of £697 14s. 4d. in ordinary gas light, it is calculated will cost £692 3s. 6d. The incandescent lamps have been in experimental use for some months past, and have evidently proved very satisfactory. In this connection, it may be noted that the Gas Committee have passed a resolution expressing the opinion that the lighting of the streets ought to be in the hands of a Sub-Committee of the Gas Committee, and suggesting that at the re-arrangement of the Committees in November next such a change might be effected.

THE PLYMOUTH GAS-POISONING CASE.

The Supervision of Gas-Fitting Work.

The inquest on the body of Henry Adye Buchan, the child who died on the 10th inst. from gas poisoning, as reported in the last number of the "JOURNAL," was resumed on Thursday, at Plymouth, before Mr. John Graves, the Deputy-Coroner. Mr. Eric Ward, Solicitor, again represented the relatives of the deceased; Mr. Elliott Square appeared for the Plymouth and Stonehouse Gas Company; and Mr. P. S. Snell, for the plumber who fixed the pipe which was found to be fractured.

The Coroner reminded the Jury that the inquest was adjourned for further evidence respecting the manner in which the gas-fitting was done in the house. It had been suggested that they should also inquire into the quality of the gas supplied. If the Jury desired, they could have evidence upon this point; but that question was gone into very fully some months ago at another inquest, and it had also formed the subject of an inquiry by a Departmental Committee, whose conclusions had been published in a Blue-Book. Under these circumstances, it hardly seemed necessary to re-open the subject.

Edward Hockin, journeyman plumber, said he was engaged about seven or eight weeks ago to fix the gas fittings and pendants at 7, Carlisle Avenue, where the mother of deceased lived. Under the floor of the back bedroom on the first floor he found an iron pipe already fixed, and connected to it a composition pipe to supply the pendant in the back parlour. The iron pipe appeared to be firmly fixed.

The Coroner: Was it properly fixed?

Witness: I should not like to say that.

I do not want to unduly press you, but you are here to tell us how the pipe was fixed?—It seemed firm.

You consider you left it in a safe condition?—Yes.

In answer to further questions, witness said he did not clamp or support the iron pipe. It was not his place to do so unless he found it loose. The flooring boards ran at right angles to the iron pipe; one piece being left loose, as usual, to afford access to the pipe.

The Coroner: It was said on the last occasion that the iron pipe had sagged, and that in doing so it had gone down upon the lead pipe and fractured it?

Witness: The iron pipe dropped down, and caused it to break. I cannot account for that.

Is your work supervised by the tradesman or contractor for whom you are working?—Not always.

Was this supervised?—No; I tested everything myself. The iron pipe seemed taut and firm; and I cannot account for it falling unless it slipped off a clamp or a nail, or some other support.

Finding it taut, you did not consider it necessary to ascertain the manner in which it was fixed underneath the floor?—The floor was fixed, and it did not seem necessary to take it up.

By the Foreman: The T-piece of the iron pipe was turned down when he found it, and he turned it up to make the joint for the supply of the pendant.

By Mr. Ward: He knew that in the bill for this work his employer also charged for repairs of leakages in the gas-fittings, which were done a few days after he completed his work. These repairs, however, were to two brackets, which belonged to Mrs. Buchan, and had nothing to do with the manner in which his work was carried out.

By the Jury: There was the thickness of a block (2½ inches) between the pipe as he fixed it and the ceiling. He considered the length of the pipe ample.

Mr. Ward: Did you leave the composition pipe bearing on the block, and supporting the weight of the iron pipe?

Witness: No; I should say there was a space of 2½ inches between the joint and the block.

By the Coroner: The escape of gas from the fractured pipe would be sufficient to supply three ordinary burners.

The Coroner said the fact that there was so large an escape of gas rather went to show the uselessness of an inquiry into the quality of the gas supplied, because the suggestion which had been put forward in the Press was that if the gas supplied had been coal gas, and not a more poisonous mixture, the accident would not have occurred.

The Foreman thought it unnecessary to go into the question of the composition of the gas. Parliament had instituted an inquiry into the use of water gas; and the interests of the public would be looked after.

The Coroner said it was admitted that the gas supplied was much more poisonous than coal gas alone; but the Gas Company were permitted to supply it. In this case there was an escape of gas in sufficient quantity to cause death, whatever may have been the composition of the gas. The fracture of the pipe was a serious thing; and the evidence as to the manner in which it was fixed was not altogether satisfactory. The plumber—a man of twenty years' experience—thought he left it safe. But it was clear that he was mistaken, and that it was not safe; and the death of the child was due to the fact that the pipe was not properly fixed. That there was an escape of gas was known to the occupants of the house some days before, and they sent for a plumber. Unfortunately, they were misled, and the plumber was misled, by the fact that the taps of the incandescent lights were on, and that there was an escape of gas from the bye-passes. Then, on further complaint, they sent for a man who attended to the meter; and when the smell of gas continued, it was put down to the work which had been done at the meter. Fortunately, the gas was turned off there at night, or the whole of the occupants of the house might have lost their lives. The fact that the child was poisoned by the gas, although both the window and the door of his bedroom were open, was accounted for by the circumstance that the gas which accumulated under the floor of the adjoining room passed over the cot in which he slept, as it made its way into the open air.

Mr. Percy Hoyte, Assistant-Manager at the gas-works, in answer to the Coroner, said the proportion of water gas sent out was 33 per cent. The gas as a whole contained from 14 to 14½ per cent. of carbon monoxide.

The Jury returned a verdict of "Accidental death," and added an expression of opinion to the effect that work such as that of the witness Hockin should always be inspected, on completion, by the employer or some responsible person.

INTERFERENCE WITH GAS AND WATER PIPES IN THE CONSTRUCTION OF LIGHT RAILWAYS.

The Light Railway Commissioners have made an order, under the Light Railways Act, 1896, authorizing the construction of light railways between Barking Town and the Beckton Gas-Works. It was applied for by the Barking District Council in May last year; and, after due inquiry by the Commissioners, they granted the application. The order has been confirmed by the Board of Trade; and it was issued last week as a Parliamentary Paper. It contains the following provisions as to gas and water pipes likely to be interfered with in the construction of the works:—

For the purpose of making, forming, laying down, maintaining, repairing, or renewing any of their railways, the Council may from time to time, where and as far as it is necessary or may appear expedient for the purpose of preventing frequent interruption of the traffic by repairs or works in connection with the same, alter the position of any mains or pipes for the supply of gas or water, or any tubes, wires, or apparatus for telegraphic or other purposes, subject to the provisions of this order, and also to the following restrictions:—

1.—Before laying down a railway in a road in which any mains or pipes, tubes, wires, or apparatus may be laid, the Council shall, whether they contemplate altering the position of any such mains or pipes, wires, or apparatus or not, give seven days' notice to the company, persons, or person to whom such mains or pipes, tubes, wires, or apparatus may belong, or by whom they are controlled, of their intention to lay down or alter the railway, and shall at the same time deliver a plan and section of the proposed work. If it should appear to any such company or person that the construction of the railway as proposed would endanger any such main or pipe, tube, wire, or apparatus, or interfere with or impede the supply of water or gas or the telegraphic or other communication, such company or person (as the case may be) may give notice to the Council to lower or otherwise alter the position of the said mains or pipes, tubes, wires, or apparatus, in such manner as may be considered necessary; and all alterations to be made under this section shall be made with as little detriment and inconvenience to the company or person to whom such mains or pipes, tubes, wires, or apparatus may belong, or by whom the same are controlled, or to the inhabitants of the district, as the circumstances will admit, and under the superintendence of such company or person or of their Surveyor or Engineer, if they or he think fit to attend after receiving not less than 48 hours' notice for that purpose, which notice the Council are hereby requested to give.

2.—The Council shall not remove or displace any of the mains or pipes, valves, syphons, plugs, tubes, wires, or apparatus, or other works belonging to or controlled by any such company or person, or do anything to impede the passage of water or gas or the telegraphic or other communication into or through such mains or pipes, without the consent of such company or person, or in any other manner than such company or person shall approve, until good and sufficient mains, pipes, valves, syphons, plugs, and other works necessary or proper for continuing the supply of water or gas or telegraphic or other communication as efficiently as the same was supplied by the mains or pipes, tubes, wires, or apparatus proposed to be removed or displaced, shall, at the expense of the Council, have been first made and laid down in lieu thereof, and ready for use, and to the satisfaction of the Surveyor or Engineer of such water or gas or other company or of such person.

3.—The Council shall not lay down any such pipes contrary to the regulations of any Act of Parliament relating to such water or gas or other company, or relating to telegraphs, and shall lay down any water-main or water-pipe at a depth of 30 inches from the surface of the road, unless it is otherwise agreed upon between the Council and the company or person to whom the main or pipe belongs, or by whom it is controlled.

4.—The Council shall make good all damage done by them to property belonging to or controlled by any such company or person, and shall make full compensation to all parties for any loss or damage which they may sustain by reason of any interference with such property, or with the private service-pipes of any person supplied by any such company or person with water or gas.

5.—If by any such operations as aforesaid the Council interrupt the supply of water or gas in or through any main or main pipe, they shall be liable to a penalty not exceeding £20 for every day upon which such supply shall be so interrupted.

6.—If any question arises under this section as to the necessity of lowering or altering the position of any mains, pipes, tubes, wires, or apparatus, or as to the reasonable satisfaction of a Surveyor or Engineer or person, or as to the amount of any compensation to be paid or otherwise, that question shall be referred to arbitration under this order.

7.—Nothing in this section shall apply in the case of any electric lines or works of any undertakers the position of which may be altered by the Council under section 15 of the Electric Lighting Act, 1882.

8.—The foregoing provisions of this section shall apply in relation to any alteration of or interference with any telegraphic line belonging to or used by the Postmaster-General, subject to the following conditions: That all works executed pursuant to this section in relation to any lowering or alteration of the Postmaster-General's telegraphic lines, or to the provision of telegraph lines for the use of the Postmaster-General, shall, if the Postmaster-General so desire, be executed by the Postmaster-General or his officers at the expense of the Council.

The preceding provisions are succeeded by others referring to the rights of authorities, companies, &c., to open roads. They are as follows:—

Nothing in this order shall take away or abridge any power to open or break up any road along or across which any railway is laid, or any other power vested in any local authority or road authority for any of the purposes for which such authority is respectively constituted, or in any company, body, or person for the purpose of laying down, repairing, altering, or removing any pipe for the supply of gas or water, or any tubes, wires, or apparatus for telegraphic or other purposes; but in the exercise of such power every such local authority, road authority, company, body, or person shall be subject to the following restrictions: (*a*) They shall cause as little detriment or inconvenience to the Council as circumstances permit. (*b*) Before they commence any work whereby the traffic on the

railway will be interrupted, they shall (except in case of urgency, in which case no notice shall be necessary) give to the Council, if there be any, notice of their intention to commence such work, specifying the time at which they will begin to do so; such notice to be given 18 hours at least before the commencement of the work. (*c*) They shall not be liable to pay to the Council any compensation for injury done to the railway by the execution of such work, or for loss of traffic occasioned thereby, or for the reasonable exercise of the powers so vested in them as aforesaid. (*d*) Whenever, for the purpose of enabling them to execute such work, the local authority or the road authority shall so require, the Council shall either stop traffic on the railway to which a notice shall refer, where it would otherwise interfere with such work, or shore up and secure the same, at their own risk and cost, during the execution of the work there: Provided that such work shall always be completed by the local authority or the road authority, as the case may be, with all reasonable expedition. (*e*) Any company, body, or person shall not execute such work, so far as it immediately affects the railway, except under the superintendence of the Council, unless they refuse or neglect to give such superintendence at the time specified in the notice for the commencement of the work, or discontinue the same during the progress of the work; and they shall execute such work at their own expense, and to the reasonable satisfaction of the Council: Provided that any additional expense imposed upon them by reason of the existence of the railway in any road or place where any such mains, pipes, tubes, wires, or apparatus shall have been laid before the construction of such railway shall be borne by the Council. If any question arises under this section between the Council and any local authority, road authority, or company, body, or person under this section, that question shall be referred to arbitration under this order.

ELECTRIC LIGHTING NOTES.

In order to meet the increasing calls for electric light, and to be prepared to cope with the demands which will be made upon them when the tramway service is municipalized and converted to electrical traction, the Oldham Town Council decided yesterday week to spend £4000 on extensions at the electricity works.

The Wigan Corporation are pushing forward their efforts to provide the town with electric light. Application has been made to the Local Government Board to borrow £90,000 for electrical and other necessary works; and at a meeting of the Electric Lighting Committee last Tuesday a tender was accepted for the buildings. It is also intended to have electric tramcars, the first line of which will be laid down past the Wigan Park.

The Shildon District Council are exercised on the subject of an electric lighting scheme, and they have decided to employ a firm of experts to report upon the suitability of the district for this system of illumination. One of the members, however, seemed to favour placing the matter in the hands of a company. He said, according to the report in a local paper, there were no less than half-a-dozen firms who would be prepared to apply for a Provisional Order, and, through the Council, to light the district. Most of the companies would be willing to give the Council the option of purchase on a valuation after a given number of years. In that case, the ratepayers would run no risk; but if, in the course of years, they wished to acquire the undertaking, they would have to pay the market price for it. At the same time, they ought to consider that they should not lose the opportunity of acquiring what might be a really good asset. Some of the companies had been paying 200 or 300 per cent. He might mention that small holdings were profitable. In some houses, they were given to understand that two or three lights were usually going. It was proposed to charge 4½d. per unit, or about one-third of what they paid to the Bishop Auckland Gas Company, or a reduction of 33 per cent. on 1000 cubic feet of gas. If they could effect such a saving, it would be a very good thing.

Few of the Local Authorities in the smaller towns which are being so industriously exploited by electric lighting companies seem to realize that these companies take very good care to make excellent terms for themselves. It is the usual practice to get the District Councils to agree to buy the prospective undertaking, if they buy at all, at a price which will include a substantial sum for goodwill, so that, whatever may happen, the company are pretty sure to come out all right. Many Corporations and District Councils are accepting agreements on these terms, and appear content with the bargain. At Dartmouth, however, one of the members of the Corporation protested strongly against such an arrangement. He pointed out that under the Electric Lighting Acts they might acquire the plant at the price which it cost, less a fair amount for depreciation; whereas the Company proposed to sell the undertaking as a going concern. They were about to give the Company a monopoly. Let them come in and work up a trade by hook or by crook, and then, if they wanted to carry on the business in the public interest, they would have to pay a high price for it. Some of the members of the Council said that without such terms the Company would never enter into the business. In a small town like Dartmouth, it would probably take years to get a profitable trade; and then, just as the works were beginning to pay, the Corporation would step in and take them. In the end, the Council agreed that the terms upon which they would have the option of purchasing should be the net outlay on the plant, less depreciation. They, however, immediately took the sting out of this heroic resolve by admitting that they did not intend to oppose the Company, even if this condition should be rejected.

An interesting incident at the recent meeting of the Croydon Gas Company, as reported in the "JOURNAL" last Tuesday, was the comment by the Company's Engineer and Manager (Mr. J. W. Helps) on the circular issued from the Electric Lighting Department of the Corporation. It may be remembered that this document set forth that, with the reduction in the price of the electric light which had just taken place, it "cost no more than gas." Mr. Helps, however, showed that, far from this being the case, 1000 cubic feet of Croydon gas at 2s. 8d., consumed with an argand burner, were equal in lighting value to 6s. worth of electricity; while in the case of incandescent gas, this quantity was equivalent to 24s. worth. The shareholders laughed—and well they might. We do not purpose questioning the policy of the officials of the Electric Lighting Department in publishing such statements as the one which Mr. Helps traversed; but the opinion expressed thereon in a local paper probably reflects that held by many of the burgesses. After alluding to the excellent position of the Company, as shown by the report presented at the meeting, the "Croydon Times" referred to the electric light circular, and said: "We may at once say that, in our opinion, those responsible for this circular have gone beyond the bounds that should govern municipal enterprise. We do not give way to anybody in the ardency of our advocacy of municipalization; we would like to see every public service in the hands of a body responsible to the public. But undoubtedly municipalization can be overdone. We certainly do not approve of the methods adopted, presumably with the consent of the Lighting and Electricity Committee, to increase the municipal electric lighting business. Touting for custom is not seemly when it is done in the name of a great Municipality; and we hope those responsible for the circulars recently issued will receive directions from the Town Hall to discontinue the practice. Mr. Helps does not so much object to the keenly commercial spirit in which the municipal electric lighting business is conducted, but he states—and, we must add, proves to demonstration—that one statement made in the circular referred to is misleading to a degree, to say the very least of it." After quoting the sentence, and Mr. Helps's comments, the writer remarked: "It will be interesting to hear what the 'electric light people,' as Mr. Helps calls them, have to say in reply. We certainly think that the proprietors of the Gas Company, as ratepayers, have a decided grievance against the authorities, who should be able to conduct the public business of electric lighting without unduly interfering with legitimate private enterprise."

THE DRY WEATHER AND THE WATER SUPPLY.

There has been no change to break the continuity of the hot, dry weather which, as shown by the reports given in the "JOURNAL" last week, is seriously affecting many parts of the country; and this summer will doubtless prove one of the driest on record. The reports received by the Meteorological Office show that there has practically been no rain anywhere in the British Isles during the last six days; and in some parts of the country no rain has fallen for fully a month. At Scilly the last rain reported fell on the 19th of July, nearly six weeks ago. In London, as, indeed, over a very large portion of the kingdom, the whole summer has been exceptionally dry. Since the commencement of June the total rain measured at the London station of the Meteorological Office is 1·9 inches, which is smaller than the average fall in any single summer month; and usually the rain in the summer three months amounts to 6·83 inches. It is not only that the summer has been persistently dry, but it has been sunny and warm; the day temperatures being far more frequently than usual above 80°. There have also been many more warm nights; the lowest reading commonly not falling below 60°. The type of weather has been anticyclonic for a long time past; and there are, at present, no indications of change.

Fortunately, the Metropolis is not suffering from a dearth of water; and although there is a diminished flow in the Thames owing to the long drought, the officials of the Thames Conservancy state that this should not afford ground for alarm. Up to the present, the Water Companies have drawn all the water they have required from the river; and yet the flow over Teddington Weir last Wednesday was 71 million gallons. This has been by no means the lowest figure, for on the 1st inst. the flow sank to 50 million gallons. The daily average for the month has been 82 million gallons, as compared with 154 million gallons in July, and 142 million gallons in August last year. It is not in the least contemplated that the diminution of flow will become serious enough to cause any inconvenience to the Companies. The springs in the Thames Valley are reported to be standing at the present moment at a higher level than they stood at the corresponding period last year; and there seems to be no reason for supposing that they will fail. Some comparative statistics may be interesting. During the fifteen years 1883 to 1897, the average daily flow of the Thames approximated to 1200 million gallons. In four years only did it fall below a daily average of 1000 millions for the year—viz., 1884, with 903 millions; 1890, with 719 millions; 1893, with 888 millions; and 1896, with 973 millions. But in 1898 the daily average for the whole year fell to 642 millions. The daily average flow for May, June, and July, 1898 and 1899, respectively, was as follows: 1898—May, 843 millions; June, 429 millions; July, 186 millions. 1899—May, 550 millions; June, 237 millions; July, 154 millions. It is a curious circumstance in connection with the flow of the Thames that it is generally lowest on a Tuesday, owing to the up-river mills, by ceasing work on Sunday, keeping back the water to fill the depleted reaches, and thereby reducing the flow over Teddington Weir. The full effect of this restriction of the flow is not felt at Teddington till two days after.

In the Provinces, Bradford is feeling very acutely the effect of the dry weather. In the early days of last week, the quantity of water stored in the Corporation reservoirs had been so greatly reduced that it was decided to further restrict the supply to consumers. On the 14th inst., as mentioned in the "JOURNAL" last Tuesday, the water was cut off between the hours of 7 p.m. and 6 a.m.; and last Wednesday the period of supply was further restricted by 3½ hours, and now extends from 5.30 a.m. to 3 p.m. only. Mr. James Watson, the Water Engineer, on Monday last week, addressed a letter to the Town Clerk, pointing out the difficulties under which his department were working, and the reasons which led him to regard this further limitation of the supply as necessary. The old works only allow of some 6½ million gallons a day being brought into the Heaton reservoir for the supply of the portions of the town on what is known as the low-level and intermediate services. The normal consumption on this level is considerably more than this; so that there is on the low-level supply a loss to be made up from other sources, rather than any balance to the good available to be pumped to the high level. Fortunately, as was pointed out last week, the pressure is somewhat relieved by the fact that, by means of special connections, the new conduit designed for the Nidd water has been made to bring into Bradford some 3 million gallons a day. This, however, only leaves the supply at 9½ million gallons per day instead of 14 millions, which had become the normal daily consumption. But to add to the difficulties of the situation, the drought is drying up the wells and the becks, and the dyers and woolcombers who had been in the habit of drawing upon these sources to a considerable extent have

found them fail, and have had to fall back on the city water-works. To such an extent has this been the case, that dyers and woolcombers have lately taken sometimes as much as 6 million gallons per day above the ordinary consumption. The danger therefore arises lest the higher parts of Bradford should be left entirely without water; and to prevent this condition of things arising, the supply has been diminished. The intention in shutting off the supply at three o'clock in the afternoon was to enable a sufficient quantity of water to be poured into the low-level reservoirs to afford a balance beyond the amount required in that district to be pumped to the high level. The quantity of water actually in store in the Bradford reservoirs, apart from the supply available through the new conduit, is very much less than it was this time last year. Then, however, restrictive measures were adopted earlier than was thought necessary this year. On the 26th of July the supply was limited to twelve hours a day, and this arrangement continued in force until the 9th of October, when a further restriction to eight hours was made. On the 22nd of October the full supply was resumed. A shortened supply of water during the night for some ten days impressed upon every householder in the city the fact that there is a drought; and this impression was emphasized on Wednesday by the cessation of the supply at three o'clock in the afternoon. The meteorological statistics kept by Mr. H. A. Johnson, M.Inst.C.E., of the Bradford Exchange, show that the drought has been practically continuous since the end of May. It is true that there was a slight break at the beginning of July, when one or two showery days were experienced; but that these showers amounted to very little is proved by the fact that the aggregate rainfall for the whole month of July was only 1·94 inches. Since the 4th of July there has been practically no rain at all; and on 38 days the rain-gauge has been absolutely empty. On a number of the remaining days there have been very slight showers, which have not provided more than 0·01 inch of rainfall. During the present month, 15 days out of 22 have been absolutely dry; and only one day has been noticeably wet. On this occasion, 0·17 of an inch of rain was registered; and that is the record rainfall for any day during August. Up to now there has been only about 0·5 inch of rain. Last year August was a somewhat rainy month, and 3·12 inches of rain were registered. In view of these figures it is not surprising to hear reports of wells shrinking and becks drying up. A meeting of the Water Committee of the Corporation was held on Friday, at which the whole question was discussed. It was stated that the present storage amounted to 735 million gallons, or sufficient to supply 30 gallons per head to consumers in Bradford, and 12 gallons per head to those in the outside townships, daily, for 60 days, supposing the rate of consumption to be reduced to 10 million gallons per day. The Committee considered the question of cutting off the water from dyeing, wool-combing, and washing establishments in the hours during which it is at present unavailable to ordinary consumers. The demand by these establishments is described as enormous; and the Committee, without coming to any definite resolution, expressed the opinion that it might be necessary, if no relief arises shortly, to place these establishments under similar restrictions to those enforced on the ordinary consumers.

In view of the present hot and dry weather, and its probable continuance, the Leeds Corporation Water-Works Committee last Friday decided to ask the aid of the public in economizing the existing supply of water. Instructions were given to at once place the pumping-engines at Arthington in working order, and to post notices throughout the city inviting the co-operation of householders and others. The storage of water on Thursday was 1472 million gallons, or 56 days' supply, as compared with 57 days' supply on the corresponding date last year. There is no overflow from the reservoirs.

During the past week the consumption of water within the area supplied by the Water Committee of the Manchester Corporation was unusually heavy. On Wednesday and Thursday it exceeded 40½ million gallons, as compared with a daily average of 35 million gallons, taking the entire seven days of the week, in ordinary times. The stock of water has now been reduced to 64 days' supply. Lake Thirlmere is 3 ft. 8 in. below the overflow sill. Only 8 million gallons per day can be taken from that source; the Longdendale works being responsible for the remainder of the supply. The Water Committee are of opinion that a deplorable waste is going on in the Manchester district, especially in the watering of gardens. Cases have come to their knowledge of the use of the hose-pipe for this purpose without an arrangement having been made with the Corporation; and the Committee have expressed the hope that people will see the reasonableness of not continuing what is an illegal practice.

It was mentioned last week that Cleckheaton had objected to the action of the Bradford Corporation in curtailing the supply of water. Last Thursday, the District Council, with the Corporation's consent, effected an arrangement with the Water Committee of the Morley Corporation whereby the supply of water from Bradford will in a few days be augmented from the Morley mains, which pass through the town. It is stated that the Morley reserve is sufficient for 200 days on the basis of their own consumption; and it is thought, therefore, that they can supply Cleckheaton without endangering their own convenience, while, on the other hand, the arrangement will relieve Bradford to some extent. The connection of the mains is being carried out under the supervision of Mr. G. H. Niven, the Gas and Water Engineer to the Council.

Heywood and Middleton are badly off for water, and are seeking help from Rochdale. At a recent meeting of the Water Committee of the Rochdale Corporation, there was a long discussion on an application on this matter from Mr. James Diggle, the Engineer to the Heywood and Middleton Water Board. This authority controls the water-works in the Naden Valley which formerly belonged to the Heywood Corporation, who acquired the undertaking from the Heywood Water Company. In addition to the storage reservoir at Clay Lane, there are two large reservoirs in the Naden Valley; but at present one of these is practically empty to permit of the repair of the embankment and the enlargement of the lodge. The ordinary resources of the Water Board are consequently largely curtailed —a rather serious matter in view of the extra demand made upon them as a result of the hot weather. The Board have to supply a large quantity of compensation water to the millowners having premises on the banks of the streams; and in the event of failure to provide this, they are liable to a penalty of £50 a day. Mr. Diggle asked whether the Committee would undertake to supply the Heywood district with 500,000 gallons of water daily, should it be required. During the discussion following the reading of the letter, it was pointed out that it would be unfair to the Rochdale water consumers for the Committee to give this undertaking. Although there is at present no scarcity of water in Rochdale, no one can say how long the drought may last; and obviously, if there was a scarcity of water at Heywood, there would be a corresponding decrease in the Rochdale reservoirs. If the Committee complied with Mr. Diggle's request, it might happen that Rochdale would not be in a position to supply Heywood with 500,000 gallons of water daily when the demand for it was made. The Committee expressed their willingness to supply the Board with a certain quantity—less than that named by Mr. Diggle —provided the Board commenced taking the water at once; either the Corporation or the Board to be at liberty to discontinue the arrangement at any time. Heywood has previously been supplied with water by the Rochdale Corporation; and the mains connected with the two sources of supply are in such a position that a junction can easily be made. The recent acquisition of the sources of supply formerly owned by the Todmorden Water Company has placed the Rochdale Water Committee in an exceptionally good position for meeting the strain caused by the drought. Up to the present, the Ramsden Wood reservoir has been used only for supplying those who were customers of the Todmorden Water Company; but it may soon be necessary to utilize this water for the benefit of the new purchasers. Already the Committee have considered the best means of doing this.

The great drought is having a very serious effect upon the water supply of Middlewich (Cheshire); and so far as the new source of supply is concerned, matters have well nigh assumed the dimensions of a famine. The scheme which was inaugurated three years ago is now producing 26,000 gallons per day. All trade supplies, including that of the Railway Company, have been stopped; and each day's yield is exhausted by about noon. The consequence is that the inhabitants have had to resort to the old system of carrying water from wells and spouts which are connected with old springs.

A grave state of affairs has arisen in connection with the water supply of several of the Black Country towns, owing to the continued drought; and at West Bromwich and Smethwick, large and important localities have been without water for several days at a stretch. It is remarkable that in some districts, and particularly at Oldbury, the pressure is fairly well maintained; while in other parts there is no water in the mains. Great inconvenience is being experienced on all hands, as owing to the action of the different Local Authorities most of the wells which formerly yielded a supply of water have been closed during the last few years. To meet the difficulty as far as possible, the sanitary authorities have suspended, partially or wholly, the watering of the streets, and are employing men to convey water in the carts used for the latter purpose to supply those localities where the scarcity exists. The South Staffordshire Water Company have been informed of the serious state of affairs, and conferences are being arranged with a view to a speedy improvement being effected. For more than twelve hours on the 19th inst. the inhabitants of Dudley were without the customary supply of tap water; and similar inconvenience was experienced nearly every day last week. During the past few days the water has been turned on for a short time in the morning and again in the evening; but the pressure in these brief intervals has been very low, with the result that the water has failed to reach the houses in the most elevated parts of the town, to which it has had to be conveyed in carts. Prior to the commencement of the business at the Dudley Police Court, last Friday, the Mayor (Alderman G. H. Dunn) alluded to the great scarcity of tap water in the borough; remarking that he and the Town Clerk were doing their utmost to get a better supply. Manufacturers had their remedy against the Company; but so far as the general public were concerned there was no legal redress. In 24 years, he had never known a suspension of the supply of tap water at his residence for 12 hours at a time until now. At Lower Gornal and adjoining villages, which are supplied by the Company, the inhabitants have decided to form a Water Protection Association. They complain that no water has been supplied to them for several days, and that they have been forced to use water obtained from wells which have been condemned in consequence of their being contaminated with sewage matter. In pursuance of resolutions passed at a conference held on Thursday night, the Mayor of West Bromwich (Mr. S. Pitt) communicated with the Company on Friday, asking if they would receive a deputation with reference to the short supply of water in different parts of the borough. The Directors replied to the effect that it would be a waste of time if the deputation waited upon them, as they were doing all that was possible in the matter. At the same time they requested the use of the whole of the Corporation vans for the purpose of coping with the difficulty, and enabling them to convey water to the inhabitants in various parts of the town where the supply was inadequate. The request was promptly complied with. The Company also promised to regulate the supply as far as possible, with a view to ensuring the proper distribution of water in all parts.

At a recent meeting of the Neath Town Council, the Water-Works Manager (Mr. E. C. Pole) reported that excessive waste of water had made it necessary to curtail the hours of supply. A liberal allowance of 20 gallons per head of the population had been calculated upon; and this storage would have been ample to meet such a demand. But the quantity which had passed through the mains was equal to 35 gallons per head per day. For a population which at the outside was not more than 15,000, a consumption of 520,000 gallons of water daily was excessive. The quantity which was now being supplied was equal to 15 gallons per head. Since the 20th of May the rainfall—and it had been much distributed—was only 3·9 inches. The quantity of water in the reservoir was increasing. There was no cause for anxiety; and it would not have been necessary to curtail the supply had not the waste been so enormous.

A short time ago, a water-main burst at Merthyr, causing a considerable loss of much-needed water. Unfortunately there has just been a second burst, which resulted in further extensive waste at a time when every gallon is required. The quantity of water now stored in the Pentwyn reservoir only amounts to 23 million gallons; and this, with care, will last for about a fortnight. It has been resolved to further curtail the use of water for domestic purposes; and consequently it will be cut off from 10 a.m. till 4 p.m., and from 8 p.m. till 5 a.m. According to Dr. C. E. G. Simons, a member of the District Council, the actual supply of water put through the mains daily has been nearly 2 million

gallons, apart from works which received compensation water. There are 12,000 houses in the parish, which therefore take on an average about 170 gallons each. Very nearly half of this water, he says, is wasted through defective service-pipes. There are some few leakages; but a great deal more water is wasted through the people leaving the taps full on, especially outside taps. As to the remedy for this disgraceful state of affairs, his suggestion is that the Council should appoint additional inspectors to examine the condition of the taps and the fittings in the houses.

At last Tuesday's meeting of the Pontypridd District Council, Inspector Johns stated that there was great scarcity of water throughout the district. In Coedpenmaen and Cilfynydd it was turned on for about two hours in the morning and two in the evening; but at Treforest the supply was limited to the morning. In some parts the supply was continuous. Dr. Howard Davies, the Medical Officer of Health, stated that the district was in a very good state of health. On the previous day he visited the reservoirs at Maerdy and Cilfynydd. At the latter place, the reservoir was practically empty, and the water which ran into it from a small stream would fill a ½-inch pipe. The old or lesser reservoir at Maerdy, which when full had a capacity of about 23 million gallons, was nearly full; but the water in the larger one was very low. He estimated the total storage at present to be between 40 and 50 million gallons. He saw the various sources of supply; and he would not be far wrong in saying that the water entering the larger reservoir might fill an inch pipe. Mr. Roberts asked whether the present storage would last 20 days. In reply, Dr. Davies stated that, calculating the population served by the Pontypridd Water Company at about 100,000, and allowing 20 gallons per head daily, it would last about 21 days. If the drought continued another month, matters would become very serious in the district supplied by the Company; and he consequently urged upon the Council and all consumers of the water to economize it as much as possible. It was imperative that the Council should assist the Company in the matter. Mr. W. Lewis moved that the Surveyor (Mr. Edward Rees) prepare a report showing the capabilities of the water-works, the rainfall for the last three months, the amount of feed, in gallons per 24 hours, going into each reservoir, the dates and localities when the water first became scarce, the quantity consumed per 24 hours when the water is on all day, and that now supplied. This was agreed to.

Mr. G. Stevens, Surveyor to the Abercarn District Council, reported on Tuesday evening that there was practically no water in stock in the reservoir, and the district depended entirely upon the springs which were flowing into the reservoir, but which were falling off considerably. There was barely sufficient to keep the district properly supplied; but there had been no curtailment. Mr. Stevens is pushing forward the almost completed water-works scheme, for which a loan of £7800 was obtained. Six of the new tanks which are located in different parts of the district, and will be fed by springs, are nearly completed, together with the mains from them. Several of the higher portions of the district to which there is no public service are in a sad plight. The new supply, which will provide for these parts, promises to be one of the best in the country.

The continued drought is being keenly felt by a considerable section of the inhabitants of Pembroke Dock. More than a week ago the tanks were practically emptied, and since then the only water available is that which runs into them from day to day. This, at the rate of 3 gallons per minute, which is the official estimated yield of the source, is about 4320 gallons a day, and as that is drawn off—one half in the morning and the other at night—it frequently happens that the people who depend on the stand-pipes at the higher elevations are unable to obtain any because it is being drained off from the lower taps before it can fill the pipes of the system sufficiently to rise to the taps in the upper stand-pipes. The scheme of a small local supplementary water supply, completed about four years ago, has failed; although, as far as securing a supply for purely domestic purposes is concerned, it might have been made adequate for the lower half of the town had a number of additional tanks been built. Even then, however, it would not have proved sufficient, in view of the demand of the Admiralty for 40 tons of water daily; far less for the sewerage works to be commenced shortly. The new water-works, which have since been put in hand as the result of pressure by the Admiralty and the Local Government Board, and are now in an advanced stage, will cost about £27,000. When completed, they are expected to be equal to meeting the Admiralty requirements, and supplying 15 gallons per day per head of the population.

Beverley Gas-Works.—The Local Government Board have approved of the borrowing of £9446 by the Beverley Town Council for gas-works purposes.

Record Gas Consumption at Leeds.—Alderman Lowden and his colleagues on the Gas Committee of the Leeds Corporation last Wednesday received from the City Accountant (Mr. Derry) a statement showing the amount of gas sold in the half year ending June 30 last. It indicated that the quantity had been 1,364,198,300 cubic feet; being an increase of 85,255,700 cubic feet over the corresponding period of last year, or 6·6 per cent. The reduction of 2d. per 1000 cubic feet on the total consumption is equivalent to £10,318 on the six months; but owing to the increased sales, the actual decrease in revenue only amounts to £1462. The sale is the largest on record at Leeds. The increase is partly attributable to the greater number of prepayment meters in use, and partly to the popularity of gas cooking-ranges.

Brighouse Gas and Electricity Supplies: Increases in Price.—At the meeting of the Brighouse Town Council last Wednesday, it was reported that the Gas Department had made a profit in the year ended March 31 last of £1364, while the Electricity Department showed a loss of £295. The Gas Committee recommend a reduction in the rate of discount allowed to consumers, which practically meant increasing the price of gas from 2s. 2d. to 2s. 6d. per 1000 cubic feet from Oct. 1 next. It was also recommended that the price of electricity should be increased from the same date 2d. per unit for lighting purposes—viz., from 5d. to 7d. per unit. There was a heated discussion in regard to the proposed changes in the charges; but, on behalf of the Gas Committee, the Vice-Chairman (Mr. C. Jessop) could not promise to arrive at any other decision. He justified the proposals on the grounds that the additional cost of coal in the year would be £1114, and on the Electricity Department there had been a loss of £206. The minutes were confirmed; the only members opposing being those of the "independent labour party."

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 532.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
590,000	10	Apl. 13	10½	Alliance & Dublin 10 p. c.	21½—22½	..	4 13 4
100,000	10	,,	7½	Do. 7 p. c.	15½—16½	..	4 10 11
800,000	100	July 3	5	Australian 5 p. c. Deb.	102—104	..	4 16 2
200,000	5	May 12	6	Bombay, Ltd.	6½—6¾	..	4 8 11
40,000	5	,,	6	Do. New, £4 paid	4½—4¾	..	5 1 1
880,000	Stk.	Aug. 16	12	Brentford Consolidated	272—277*	..	4 6 8
570,000	,,	,,	9	Do. New	310—315*	..	4 3 9
50,000	,,	,,	5	Do. 5 p. c. Pref.	140—145*	..	3 9 0
159,375	,,	June 15	4	Do. 4 p. c. Deb.	126—130	..	3 1 7
220,000	Stk.	Mar. 29	11½	Brighton & Hove Orig.	260—270	..	4 5 2
226,320	,,	,,	8½	Do. A. Ord. Stk.	194—197	..	4 6 4
973,500	Stk.	Aug. 16	5	Bristol, 5 p. c. max.	125—130*	..	3 16 11
420,000	20	Mar. 29	10	British	44—46	..	4 6 11
50,000	10	Feb. 24	12	Bromley, Ord. 10 p. c.	25—27	..	4 8 11
75,000	10	,,	9	Do. 7 p. c.	20—22	..	4 1 10
500,000	10	Apl. 27	6	Buenos Ayres (New) Ltd.	10—10½	..	5 14 3
220,000	Stk.	June 29	4	Do. 4 p. c. Deb.	100—102	..	3 18 5
150,000	20	July 13	8½	Cagliari, Ltd.	28—29	..	5 13 10
100,000	10	June 1	7½	Cape Town & Dis., Ltd.	13—14	..	5 7 2
50,000	50	May 2	6	Do. 6 p.c. 1st Mort.	56—58	..	5 3 5
550,000	Stk.	Apl. 13	13½	Commercial Old Stock	316—321	..	4 4 1
200,750	,,	,,	10½	Do. New do.	245—250	..	4 4 0
200,750	,,	June 15	4½	Do. 4½ p. c. Deb.	143—148	..	3 0 10
800,000	Stk.	June 15	10	Continental Union, Ltd.	185—190	..	5 5 3
200,000	,,	,,	7	Do. 7 p. c. Pref.	182—187	..	3 14 10
51,600	Stk.	Feb. 24	14	Croydon A 10 p. c.	—	—	—
168,400	,,	,,	11	Do. B 7 p. c.	—	—	—
555,000	Stk.	Aug. 16	5½	Crystal Palace Ord. 5 p. c.	131—138*	..	3 16 1
60,000	,,	,,	5	Do. 5 p. c. Pref.	140—145*	..	3 9 0
486,090	10	July 28	11	European, Ltd.	22½—23½	..	4 13 7
354,060	10	,,	11	Do. £7 10s. paid	16—17	..	4 17 1
14,993,075	Stk.	Aug. 16	4 5/10	Gas- 4 p. c. Ord.	107—109*	..	4 9 11
2,600,000	,,	,,	3½	light 3½ p. c. max.	95—98*	..	3 11 5
3,799,735	,,	,,	4	and 4 p. c. Con. Pref.	123—125*	−1	3 4 0
3,993,975	,,	June 15	3	Coke 3 p. c. Con. Deb.	99—101	..	2 19 5
70,000	10	May 31	8	Hongkong & China, Ltd.	13½—14½	..	5 10 4
3,800,000	Stk.	May 12	10	Imperial Continental	223—228	..	4 7 8
473,600	Stk.	Aug. 16	3½	Do. 3½ p. c. Deb. Red.	101—104*	..	3 7 4
75,000	5	June 15	6	Malta & Medn., Ltd.	5—5½	..	5 9 1
560,000	100	Apl. 4	5	Met. of 5 p. c. Deb.	112—114	..	4 7 9
250,000	100	,,	4½	Melbourne 4½ p. c. Deb.	110—112	..	4 0 4
541,920	20	May 31	5	Monte Video, Ltd.	12½—13½	..	7 8 1
617,946	Stk.	Feb. 24	9½	Newc'tle & Gatesh'd Con.	228—233	..	3 19 5
264,855	Stk.	June 29	3½	Do. 3½ p. c. Deb.	106—109	..	3 4 3
					* Ex div.		

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
150,000	5	May 31	8	Oriental, Ltd.	7½—8	..	5 0 0
135,000	5	,,	8	Do. New, £4 10s. pd.	6½—7	..	5 14 3
15,000	5	,,	8	Do. do. 1879, £1 pd.	1½—1¾	..	4 11 5
60,000	5	Mar. 29	7	Ottoman, Ltd.	5½—6	..	5 16 8
500,000	100	June 1	6	People's Gas of Chicago 2nd Mtg. Bonds	102—106	..	5 13 2
851,070	10	Apl. 27	7	River Plate Ord.	11½—12	..	5 16 8
250,000	Stk.	June 29	4	Do. 4 p. c. Deb.	100—102	..	3 18 5
250,000	10	Mar. 29	10	San Paulo, Ltd.	16—17	..	5 17 8
135,000	Stk.	Mar. 29	10	Sheffield A.	244—249	..	4 0 4
209,053	,,	,,	10	Do. B.	244—249	..	4 0 4
447,427	,,	,,	10	Do. C.	244—249	..	4 0 4
5,600,000	Stk.	Aug. 16	5⅓	South Metrop., 4 p.c. Ord.	140—143*	..	3 14 7
1,520,000	,,	July 13	3	Do. 3 p. c. Deb.	101—103	..	2 18 3
120,000	Stk.	—	6	Tottenham A. 5 p.c. and B. 3½ p.c.	143—145	..	4 2 9
250,520	,,	—	4½		103—105	..	4 5 9
55,100	,,	—	4	Edmonton 4 p.c. Deb.	115—120	..	3 6 8
182,380	10	June 15	5	Tuscan, Ltd.	9—10	..	5 0 0
149,900	10	July 3	5	Do. 5 p. c. Deb. Red.	98—100	..	5 0 0
				WATER COMPANIES.			
746,184	Stk.	June 29	11	Chelsea, Ord.	313—318	..	3 9 2
150,000	,,	,,	5	Do. 5 p.c. Pref.	167—170	..	2 18 10
160,000	,,	,,	4½	Do. 4½ p.c. Pref. '75	148—153	..	2 18 10
175,785	,,	Mar. 29	4½	Do. 4½ p.c. Deb.	155—160	..	2 16 3
1,720,560	Stk.	Apl. 18	7	East London, Ord.	210—215	..	3 5 1
654,740	,,	June 29	4½	Do. 4½ p. c. Deb.	155—158	..	2 17 0
390,000	,,	,,	3	Do. 3 p. c. Deb.	101—103	..	2 18 3
700,000	50	June 15	7½	Grand Junction 10 p.c. max.	111—114	..	3 5 9
310,000	Stk.	Mar. 29	4	4 p.c. Deb.	135—140	..	2 17 2
708,000	Stk.	Aug. 16	14	Kent	358—363*	..	3 17 2
160,000	,,	,,	7	Do. New, 7 p. c. max.	208—213*	..	3 5 9
1,043,800	100	June 29	10½	Lambeth, 10 p. c. max.	298—303	..	3 9 4
406,200	100	,,	8	Do. 7½ p. c. max.	225—230	..	3 9 7
350,000	Stk.	Mar. 29	4	Do. 4 p. c. Deb.	135—140	..	2 17 2
500,000	100	Aug. 16	12½	New River, New Shares	425—430*	..	3 2 9
1,000,000	Stk.	July 28	4	Do. 4 p. c. Deb.	135—140	..	2 17 2
902,300	Stk.	June 15	7½	South-wark and Vauxhall 7½ p. c. max., 5 p. c. Pref., 4 p. c. A Deb.	202—207	+2	3 12 5
126,500	100	,,	7½		193—198	..	3 15 9
489,200	Stk.	,,	5		167—172	..	2 18 2
1,019,585	,,	Apl. 13	4		135—140	..	2 17 2
1,155,066	Stk.	June 15	10	West Middlesex	300—305	..	3 5 7
200,000	,,	,,	4½	Do. 4½ p. c. Deb.	154—158	..	2 17 0
200,000	,,	Mar. 10	3	Do. 3 p. c. Deb.	102—104	..	2 17 8
					* Ex. div.		

NOTES FROM SCOTLAND.

From Our Own Correspondent.

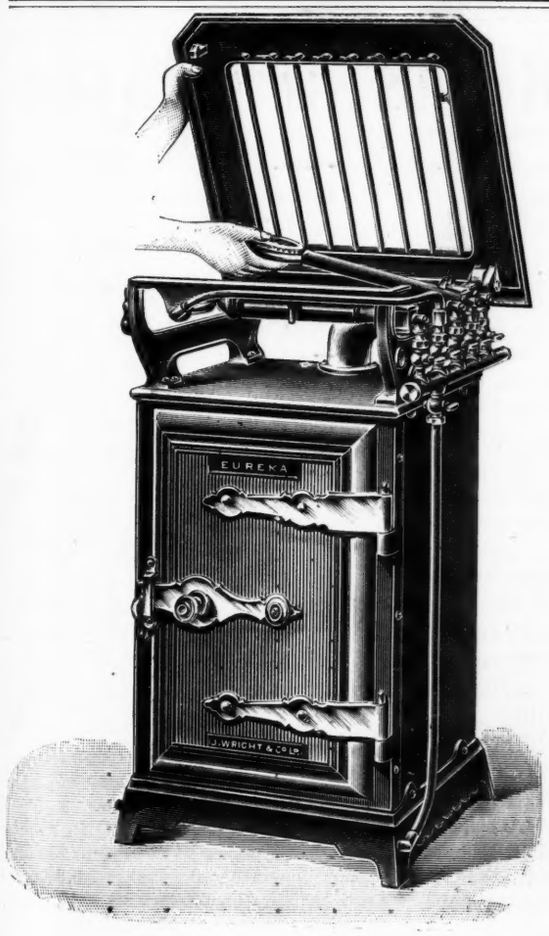
Saturday.

The excessive drought which is being experienced over the United Kingdom is being regarded as the most serious since 1868. Yesterday there were severe thunderstorms in the West of Scotland, from Ayrshire to Stornoway, and copious rains fell; but in the eastern districts there was neither thunder nor rain. There has not been a shower of rain of any consequence in any part of Scotland since July 22—that is 31 days of continuous dryness, accompanied by arid winds, which have had a scorching effect upon vegetation. The absence of rainfall has had the usual effect of drying up water sources. At the same time, the great heat has led the populace to use more water; and thus, the candle burning at both ends, as it were, water supplies are diminishing fast. There were, however, heavy rains in the early part of the summer; and generally there has been no inconvenience as yet. Next month may tell a different tale, unless relief should come. The place which has suffered most from want of water is Prestwich, a great golfing resort in the neighbourhood of Ayr. There the water supply is defective and of doubtful quality—both conditions which cannot be tolerated by a community of the status of the golfing fraternity; and indignation is being freely expressed at the conduct of the Local Authority in not looking better after the water supply of the place. It is also reported that Glasgow, with its apparently abundant supply, is not escaping without feeling the extraordinary demand. Both Loch Katrine and the Mugdock and Craigmaddie reservoirs are going down very rapidly; and while the Corporation have enough water to supply every reasonable requirement of the people, yet they have not nearly sufficient to meet the present totally unnecessary drain. The daily consumption has now reached 60 gallons per head of the population per day. This amount is far in excess of any reasonable requirements, and cannot possibly be used in ordinary domestic work, but must be recklessly wasted. The Corporation have made known that they look to the inhabitants to help them and their servants to prevent waste of water by immediately reporting to the Water Office, or the policemen on their beat, any case of waste of water. Should the present excessive use of water continue, together with warm, dry weather, the Corporation will be compelled to take necessary steps to curtail the supply by shutting down the valves for stated periods of the day or night. The works connected with the raising of the level of Loch Katrine are progressing rapidly; but until this is completed, the loch will not stand the unusual drain which is at present going on. It has not been drawn down so far as it is at present since 1868. In Arbroath there is scarcity of water, which is said to be due to a leak in a pipe. The Corporation still adhere to their pumping scheme, and are, indeed, extending it. I rather fear that the scarcity is in the supply, and that the truth will come home to the Corporation by-and-bye that they cannot get a sufficient supply from underground, but will be obliged to go in for a gravitation scheme. It was reported to them, several years ago, by Mr. Wilson, of Edinburgh, that such a scheme was the only feasible one for the burgh.

An illustration of how enlightened management benefits both the gas undertaking and the community is furnished at Banff. The first Manager of the Gas Company there was a Mr. Watson; and he held the position for over fifty years—retiring about ten years ago. Naturally, in his day the policy was of the standstill order. The plant was old-fashioned, and falling into disrepair. His successor (Mr. M'Dougall) began a scheme of reconstruction; but he shortly left Banff, and the work of furthering it fell to the present Manager (Mr. W. Marshall), who is the third in office. The thoroughness of Mr. Marshall's work is that which strikes a visitor first. Not to speak of the renovation of the street mains, which has been a constant and a costly task, the works have been transformed into a state of completeness which, except in the matter of storage for gas, might well entitle Mr. Marshall to rest and be thankful. Steam has been introduced, which has enabled a regenerative system of carbonizing to be adopted, an exhauster to be started, and other work to be accomplished which could not be done without it. The regenerative settings are an adaptation of the Klönne system; and the yield from them is over 10,000 cubic feet of gas per ton of coal, as compared with a little over 8000 feet before. The other plant is all up to date, and includes—what would scarcely be expected—a modern photometer. All these improvements have cost money; but the expenditure has been judiciously made, and is yielding fruit in the increased business of the Company, better profits, a dividend more than maintained, cheaper gas, and improved prospects. In the financial year which ended in June, the output of gas was greater than in the previous year by 580,300 cubic feet. The other returns are correspondingly increased. Altogether, the position of the Company is such that the Directors and shareholders may well feel gratification at the way their business is being conducted. It should be mentioned that the reconstruction of the works has, on account of their small area, required some troublesome engineering problems to be solved; and that these have been dealt with by Mr. Marshall in quite an interesting and ingenious manner.

It is announced from Airdrie that the Gas Company there are raising the price of gas from 2s. 6d. to 2s. 11d. per 1000 cubic feet; and, in view of the proceedings for the transfer of the undertaking to the Corporation, a writer in a local newspaper wishes to know whether the Company desire a shower of indignation speeches. The Gas Company, I presume, know their business.

An attempt is being made in Edinburgh to organize a branch of the Gas Workers' and General Labourers' Union. At a meeting of the Trades' Council on Tuesday night, it was reported by a deputation from the Council who had been appointed to attend a meeting of the workers, that it was thought that a strong branch would be formed, as, at the outset, they had the names of eighty or ninety men. This statement was applauded. The Council are surely thankful for small mercies. The Union, as is well known, could not exist among gas workers—which is, I think, the best testimony that could be had of the general contentedness of that body of men—and they accordingly drag in the labourer class. There must be thousands of labourers in Edinburgh; and yet less than a hundred of them care to join the Union. Evidently the men know that the prospects of bettering their condition lie, not with the paying away of threepences per week to maintain a great organization, but in



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doing their work honestly, and thus securing for themselves steady employment and regular wages for their own support. In the Edinburgh Gas-Works, with the advance already given, there is not likely to be much encouragement held out to the organizers.

The liquidators of the Helensburgh Gas Company have realized the assets and paid the liabilities of the Company. Their report shows that the total sum divided among the shareholders amounted to £33,354, which is equal to £12 1s. per £5 share. The sum received for the works was £31,116, and for stocks and accounts £2915. The late Manager of the Company (Mr. Smith) was paid a bonus of £200, and the expenses of valuation and liquidation amounted to £126. I cannot help thinking that a Company the shareholders of which have had returned to them more than double the capital which stood in their names might have been more liberal to their Manager.

A meeting of the shareholders of the Kincardine-on-Forth Gas Company has been called, to pass a resolution for the dissolution of the Company.

The official Gas Examiner at Stirling has reported to the Town Council that the average illuminating power of the gas supplied by the Company on July 18 and Aug. 1 was 26·7 and 26·8 candles respectively. This is considerably above the standard requirement of 21 candles. The Gas Company have hitherto attended to the lighting and extinguishing of the street-lamps, as well as the supply of gas to them. This they are to do no longer. They have required the Corporation to enter into a new agreement, under which the Corporation do all the work and pay the domestic rate for the gas consumed. This will raise the cost of public lighting considerably, and is one of the first-fruits of the antagonism on the part of the Corporation towards the Company. For the past year the cost of street lighting was £631, as compared with £612 in the preceding year. The cost was thus already rising; but the increase in the current year will be much more marked.

To the north of Aberdeen, about seven miles, there is the village of Dyce, to which, a few years ago, the Corporation of Aberdeen made offer of a supply of gas. The offer was not accepted. Since then nothing has been done in the matter of the lighting of the place; but on Monday night the inhabitants were convened to consider as to the propriety of forming a special lighting district. A clergyman presided; and he took credit to himself for having been the cause of the offer of gas not having been accepted, although, at the time, he said, some of the inhabitants were rather keen on availing themselves of the opportunity. His reason for advising delay was that in the course of a few years facilities might arise for the introduction of the electric light. This prediction, he considers, has come true sooner than he expected. A firm of electrical engineers have visited the place; and their report is to the effect that the district can be lighted with electricity by means of utilizing the spare water of the water supply. The proposal is more extraordinary still. The offerers are to give £80 a year to the Local Authority for permission to use the water power, and to relieve the Authority from the necessity of keeping a man to look after the place. This amounts to about £100 a year. The conclusion is that the public lighting would not cost more than this sum, and that thus the thoroughfares would be lighted for nothing. In return, the offerers are to sell electricity for private lighting at the price of 25s. 6d. per 16-candle power lamp per annum. The meeting resolved to proceed with the formation of a special lighting district. Such a handsome offer as that which has been made to the Dyce Local Authority is somewhat perplexing. It is not usual for the purveyors of light, of any description, to pay for the privilege of supplying it. I lay aside the notion of the public lighting being obtained for nothing; for the undertakers must recoup themselves in some form for their outlay, and this can only be done by the charges they make for private lighting. But, taking this into account, I cannot see how they could make the venture pay. Even the rate they propose is considerably more than would be paid for gas; and in a country community, with early hours the rule, the yield from the private lighting would be small—even granting that the light was generally taken, which I incline to believe it would not be. There are difficulties in the carrying out of the offer which are either not appreciated by the Local Authority or are not explained to the public. The subject will be worth keeping in view.

A conviction was secured by a plea of guilty, in the Aberdeen Police Court, on Thursday, against a carpenter for a theft of gas. The accused made use of the common device of an india-rubber connection; but he went farther than is usually done, in that he disconnected the meter altogether, and joined up the inlet and outlet pipes. A fine of £1 was inflicted, with the alternative of ten days in jail. The crime is not a customary one, which is fortunate, because, on account of the facilities there are for committing it, it is somewhat in the same category as sheep stealing, for which, within the memory of people still alive, the punishment was hanging.

Mr. J. Kincaid, in his criticism of my remarks of a fortnight ago, removes from himself the responsibility for the stoppage of the Peebles oil-gas process in the gas-works at Falkirk. I was aware of the stoppage; but the costly plant was still in existence, and might have been held as a stand-by, whereas it is not there now. I cannot see how he can get over the statement about disparagement of the oil-gas process, when the quotation I gave is remembered, to the effect that it was "impossible at present to manufacture oil gas, and the manufacture of it has been given up in all places in Scotland at present." Can either of these statements be substantiated?

Bingley and the Cullingworth Gas-Works.—The Cullingworth Gas Company have refused the offer of £5000 made to them for their works by the Bingley District Council; and, in consequence, the Clerk of the latter body has been instructed to inquire of the Directors the lowest price they are prepared to accept for the undertaking.

The Workmen's Compensation Act.—The Secretary to Waring and Gillow, Limited (Mr. John S. Warr), has written as follows to "The Times": "Some six months ago we gave you our experience under the Act, and showed that for the half year from July 1 to Dec. 31, 1898, our claims had been £93, against £1250 asked by the Insurance Companies for six months' premium. For the six months ended June 30, 1899, our payments for injuries amount to £18; making £111 for the year."

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TORONTO (Second Contract; Remodelled)	2,000,000
BELLEVILLE	250,000
OTTAWA (Second Contract)	250,000
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YORK	750,000
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ENSCHEDE	150,000

AND ADDITIONAL WORK.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Aug.* 26.

Sulphate of Ammonia.—Throughout the week, there has been a quiet tone in the market; but values are unchanged—the closing quotations being £12 6s. 3d. to £12 10s. per ton f.o.b. at the ports. Direct demand continues to absorb available supplies. There has also been buying for September at spot prices, and still larger inquiry; but buyers are for the most part postponing operations for the chance of doing better as production increases. Further ahead makers remain firm, while buyers show very little interest.

Nitrate of Soda is steady at 8s. per cwt. for fine quality on spot.

LONDON, *Aug.* 26.

Tar Products.—There is no change in the value of products of such moment as to cause comment. The production continues low, makers are well sold, and buyers are not eager to purchase for forward delivery at the higher rates being asked. Lower prices are offered for tar, as it is felt that, with the increased production later on in the year, prices may fall to some extent. An important factor in the value of tar is the circumstance that anthracene is practically unsaleable; and the outlook for it is not by any means hopeful.

Average values of to-day may be taken at: Tar, 16s. to 25s. 6d. Pitch, east coast, 33s. 6d.; west coast, 31s. Benzol, 90's, 8d.; 50's, 9½d. Toluol, 1s. 2d. Solvent naphtha, 1s. 2d. Heavy naphtha, 1s. 1d. Crude, 30 per cent., naphtha, 3½d. to 4d. Creosote, 3¼d. Heavy oils, 62s. 6d. Carbolic acid, 60's, 2s.; 75's, 2s. 6d. Creosote salts, 52s. 6d. Anthracene, nominal, "A," 3¾d.; "B," 2¾d.

Sulphate of Ammonia.—The week's business has been marked by some fluctuations, and particularly by the disparity in prices obtaining at the different ports, arising doubtless from market operations of dealers. Average value may be taken at £12 5s., less 3¼ per cent., while for forward delivery makers are asking £12.

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—The position in the coal trade here is exceedingly strong for the time of year. With the continued excessively hot weather, the demand for the better qualities of round coal is necessarily reduced to the smallest possible limits. With pits working four to five days per week, stocks are increasing; but these are still generally considerably below the average for the summer season, and collieries show no disposition to push sales, with list rates well maintained on the recent basis, and comparatively little or no underquoting with surplus supplies in the open market. Steam and forge qualities move away freely, all the output being disposed of; and selling rates are firm at full late quotations. At the pit, best Wigan Arley averages 11s. 6d. to 12s. 6d. per ton, Pemberton four-feet and seconds Arley 10s. to 11s., common house coal 9s. to 9s. 6d., steam and forge descriptions 8s. 9d. to 9s. Supplies of engine fuel are becoming increasingly scarce, and this has led to a further rise in prices; the Lancashire Coal Sales Association having decided to put up list rates 5d. per ton—making a total advance on last year's prices of 2s. 6d. per ton. Average pit prices with the close of the month will be about 7s. to 7s. 6d. per ton at the pit for best slack, 6s. to 6s. 6d. for medium, and 5s. to 5s. 6d. for common sorts. Coke is in brisk request; makers, in fact, having to refuse a good deal of the business offering even at the full prices. At the ovens in this district, ordinary furnace coke is fetching 17s. to 19s. per ton, and foundry qualities 26s. to 27s.

Northern Coal Trade.—A scarcity of vessels to carry coal has influenced the trade of the North, and has caused the price of best steam coals to fall off, though there is not the same effect on other kinds of coal. Best Northumbrian steam coals are now quoted from 12s. 3d. to 12s. 6d. per ton f.o.b., second class 11s. 9d. to 12s., and steam smalls 6s. 9d. to 7s. Manufacturing coals are brisk in sale; the prices being those that rule under the contracts that have been running for some time. In regard to gas coal, there is now felt an increasing demand, both locally and for shipment. This is mainly under contracts that are running at fair prices, but below the current quotations for occasional cargoes. The prices for the latter are about 10s. per ton f.o.b.; and the coal is not over-plentiful. Gas coke seems to be firmer this week; the quotation being now 14s. per ton f.o.b.

Scotch Coal Trade.—The market continues active, with supplies about equal to the demand. Splint is in exceptionally good request. The prices quoted are: Main 9s. 3d. to 9s. 6d. per ton f.o.b. Glasgow, ell 9s. 6d. to 10s. 3d., and splint 10s. 6d. The shipments for the week amounted to 191,436 tons—an increase of 7088 tons upon the previous week, but a decrease of 53,018 tons upon the corresponding week of last year. For the year to date, the total shipments have been 5,456,760 tons—a decrease of 627,973 tons upon the same period of last year. Last year's exports were inflated on account of the strike of miners in South Wales.

Gas-Engines on the Hire and Hire-Purchase Systems at High Wycombe.—A short time ago the Manager and Secretary of the High Wycombe Gas Company (Mr. J. F. Wicks) made a report to the Directors on the subject of letting gas-engines on hire, or selling them on the hire-purchase system. There are a number of small manufacturers in the town, which is well known as the centre of the chair-making industry; and the idea was at once adopted as a means of stimulating trade by providing the means of obtaining power at a cheap rate. In addition to this new departure, which we believe is the first of the kind, the Company have made arrangements to lay on supplies, and fix, free of cost, internal fittings suitable for each respective requirement for workshops; also to keep and maintain, free of charge, all ordinary fittings, and renew burners when necessary. The Directors have opened central offices and showrooms for the convenience of customers, and are showing in other ways that they are determined to keep abreast of the times; and their efforts are ably seconded by their Manager.

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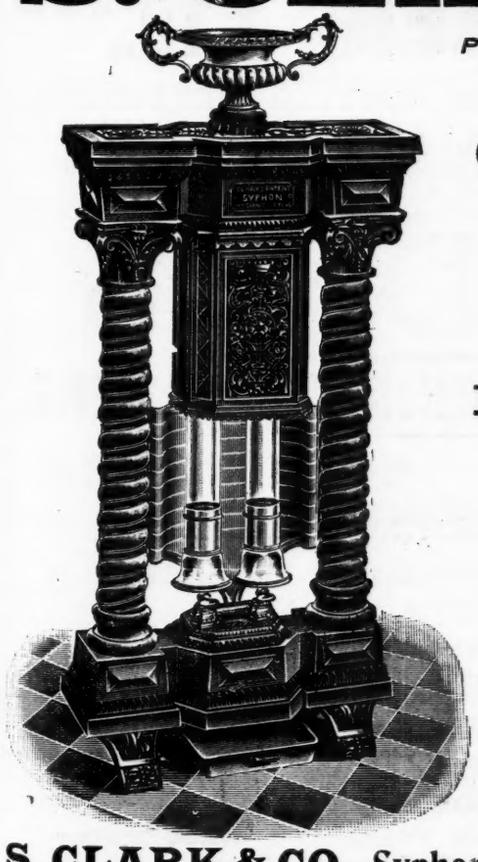

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Wenlock Water Supply.—The Town Council of Wenlock having applied to the Local Government Board for sanction to borrow £3000 for water supply, Mr. H. P. Boulnois, one of the Inspectors, held an inquiry on the matter last Wednesday week at the Guildhall. Alderman J. Bodenham (Chairman of the Committee), Mr. Godfrey Cooper (Town Clerk), and officers and members of the Corporation, were present, as well as the representatives of Lord Forester, Lord Wenlock, and others. The Town Clerk stated that the assessment value of the district was £5991; the rateable value, £6973; and the population, 2180. The borough was peculiar in its constitution—being divided into four sanitary districts; and this application only applied to the Wenlock division. Analysis of the water showed that although hard, it was good for drinking purposes. Alderman Bodenham spoke as to the necessity of a good water supply. Athough there was no scarcity in the town, the quality of the water was rather doubtful. Dr. Gepp (the Medical Officer of Health) said the water in question was spring water, and there was no probability of contamination, as it appeared to come from a good distance. Mr. Wyatt (the Engineer) said the scheme would supply 30,000 gallons a day, and the reservoir would hold 90,000 gallons. The scheme appears to be generally approved of in the town; although various representatives of landowners objected to pay for it, as their tenants would not use the water. The Inspecter promised to lay the objections before the Board.

Milton and Sittingbourne Water Supply.—A serious state of affairs is at present existing at Milton-next-Sittingbourne, in consequence of a dispute between the Local Authorities of the two places. It appears, from statements made at the fortnightly meeting of the Sittingbourne District Council, that for some years an agreement has been in existence whereby the Sittingbourne District Council (who own the water-works at Keycol Hill) undertake to maintain a full supply of water for Milton. In consequence of successive dry seasons, the resources have had to be augmented by obtaining an auxiliary supply from the private works. Now, however, the Milton Council have declined to pay anything towards the cost of this water; maintaining that the arrangement was outside the agreement. The Chairman (Mr. E. A. Rossiter) said it did not seem feasible that the Milton Council should expect to enjoy the benefit of the extra supply, and also to receive one-third of the water receipts from the parishes of Murston, Halston, Newington, and Rainham, without paying anything for the water. The Council decided to cut off the supply from Milton, and restrict the Council to the Keycol Hill supply. The result of this has been that great scarcity of water exists at Milton, and considerable indignation has been aroused against the Milton Council. The Council thereupon held a special meeting, at which they decided to pay their share of the expenses; and a cheque was sent to the Sittingbourne Council. The latter body, however, refused to accept it, in consequence of the Milton Council declining to enter into an agreement to pay their proportion of the outlay incurred in obtaining the auxiliary supply in future. There the matter rests for the present. Meanwhile, several hundreds of householders in Milton are suffering from want of water during a greater part of the day; whereas at Sittingbourne the pressure has been so great as to burst the mains.

The Illegal Use of Water for Gardens.—At the North London Police Court, last Tuesday, Mr. Arthur Gill, Barrister, and Mr. George Kebbell Solicitor to the East London Water Company, attended before Mr. Bros and applied for summonses against 40 consumers within the district of the Court for wilfully wasting water. Mr. Gill stated that, owing to the long-continued drought, it had become necessary to put in force the means provided by the statutes for preventing the waste and misuse of water. It was a singular fact that persons who would be shocked at being called dishonest were undoubtedly guilty of dishonesty in the lavish use of water. The persons now complained against had garden hoses to which sprinklers were attached. Mr. Kebbell informed him that careful calculation had been made, and it appeared that 400 gallons of water would pass through a ½-inch pipe in the course of an hour. If water were allowed to run for 24 hours, as some persons who had lawns allowed it to do, enough water to supply 285 persons would be wasted, or, on what was called the "famine" supply, sufficient for 500 or 600 persons. He asked that the summonses should be granted and made returnable for Monday, the 18th of September. Having ascertained that this would be convenient to the Court, Mr. Bros granted the summonses without comment. Mr. Gill said one object of the application was the hope that the publicity given to it would cause people to consider the question of garden watering, and then perhaps more serious consequences would be avoided. Other summonses were taken out during last week at the Thames, Stratford, and West Ham Police Courts.

Suicide by Inhaling Coal Gas.—Last Thursday, Mr. H. R. Oswald held an inquiry at the Lambeth Coroner's Court concerning the death of a middle-aged man who committed suicide at 85, York Road, Lambeth, on the 19th inst. Alfred Oakley, a meat carver, of the above address, said the man called at his house on the evening of the above-named day, and engaged a bedroom for one night. He told the witness's wife that he was going to a theatre, and would be back at eleven o'clock. He returned at that hour, and said he would not require any breakfast. When he retired to his room he seemed very comfortable and pleasant. At 11·30 the next morning witness was going out, when his servant informed him that the lodger had left the gas turned on. Witness went to the room, and found the man sitting on a chair at the table, fully dressed with the exception of his hat, which was on the bed. Leading from the chandelier was a piece of new india-rubber tubing, the free end of which passed under the deceased's forearm, and rested close to or in his mouth. He was apparently asleep; but witness shook him, and found he was dead. The man had a small handbag with him when he came, and had evidently brought the tubing with him. In order to prevent it from "kinking" he had fastened a clothes-brush to the chandelier with a piece of wire. The gas had been turned full on. Evidence was given which pointed to the body being that of a Glasgow man named M'Dermott. In a waste-paper basket were found a few scraps of paper, and on piecing them together the following words appeared: "19/8/99, London.—Don't go to any expense in holding an inquest. Let scientists have my body if they want it.—Hugh M'Dermott." The medical evidence was to the effect that death had been caused by the inhalation of coal gas. The Jury returned a verdict of "Suicide during temporary insanity."

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Carlisle Gas and Water Finances.—The profits of the gas and water undertakings of the Carlisle Corporation for the past financial year show a substantial increase on those realized in the year 1897-8. The gross profits from both concerns amounted to £15,856, as compared with £15,145 before. The gross gas profits came to £9694, against £9089; and the gross water profits to £6161, against £6056. The net profits from both gas and water works reached a total of £14,741, against £14,095. The gas-works are responsible for £8758, against £8198; and the water-works account for £5983, against £5896.

Visit of the Sheffield Corporation to the Derwent Watershed.—The members of the Sheffield Corporation, accompanied by a number of friends, recently paid an official visit to the Derwent watershed, in which, as will be remembered, they have recently acquired an interest under the provisions of the Derwent Valley Water Act. The arrangements for the day were made by the Water Committee and their General Manager (Mr. W. Terrey); and they were satisfactorily carried out. A special train conveyed the party, which included Mr. E. M. Eaton, the Consulting Engineer to the Corporation, from Sheffield to Bamford, whence they were taken to the sites of the reservoirs. Interesting particulars of the works to be constructed were furnished by the programme distributed to the members of the party, as well as by Mr. Eaton and Mr. Terrey verbally *en route*. The area of the Derwent watershed is 19,702 acres, and that of the four reservoirs 594 acres; giving storage for 6364 million gallons. The Ashop drainage area is 12,244 acres, and the reservoir area 319 acres; giving storage for 3632 million gallons. The locality is very sparsely populated, and consequently the buildings to be removed when the reservoirs are made are few.

Shrewsbury Water Supply.—At the last meeting of the Shrewsbury Town Council, a long report was presented by Messrs. John Taylor, Sons, and Santo Crimp, on the water supply of the city. They submitted two schemes—one a gravitation and the other a pumping scheme. The latter—the cheaper of the two—was not recommended, on account of the hardness of the water and the uncertainty as to the permanence of the supply. The sum of £66,000, exclusive of land or easements, was the estimate given for it; but this figure does not include anything for capitalized working expenditure, though it is estimated that coal alone would cost £1100 per annum. If working expenses, calculated at 30 years' purchase, are added to the capital outlay, a total of £105,000 is produced for a well supply. The other scheme, and the one recommended, is an upland supply which will gravitate to any part of the town, and give the necessary pressure at all points. The gathering-ground is the Batchcott Hills watershed, where, it is stated, a much larger area can be obtained than at Church Stretton; and the quantity and quality of the water are guaranteed. The cost of this scheme, exclusive of the land and easements, is put down at £127,400; but there is an item allowed for contingencies which is said to be sufficient to cover the easements. If the Town Council decide to follow the advice of their Engineers, the town will be committed to an outlay which may be roundly summed up at £130,000. This is very heavy; but there is apparently no help for it.

Reduction in Price.—The Directors of the Colney Hatch Gas Company have decided to reduce the price of gas from 3s. 10d. to 3s. 8d. per 1000 cubic feet as from the 1st of October.

The East Dereham District Council and their Late Gas Manager.—At a special meeting of the East Dereham District Council last Tuesday, the Clerk (Mr. B. H. Vores) reported that the Auditor had gone through the accounts of the Council for the year ending the 31st of March last, and ascertained the total amount of the alleged defalcations by Mr. A. Drage, the former Gas Manager. This, he stated, had since been received from Mr. Drage, accompanied by an application that the Council should withdraw the proceedings already instituted (*ante*, p. 435). It was decided not to offer any evidence against him at the hearing, which had been fixed for the following Friday.

St. Helens Corporation Gas and Water Finances.—The Borough Treasurer of St. Helens (Mr. J. Brown) has just issued his report on the accounts of the borough for the year ending the 31st of March. With respect to the gas undertaking, the receipts were £42,280, of which £32,244 was derived from the sale of gas, and £9518 from the disposal of residual products. The balance of profit for the year was £7413. The capital account showed that the total amount expended on the works had been £264,065; and the reserve fund stood at £6349. The total income on the water-works account had been £25,324; while the expenditure had been £24,060.

Water-Works for Wyvenhoe.—A Local Government Board inquiry was held last Thursday by Mr. W. A. Ducat, at Wyvenhoe, respecting an application by the District Council for permission to borrow £4450 for water-works purposes. A site for a well has already been chosen; and the tendering firm have based their calculations on a population of 3000, and a consumption of 15 gallons per head per day. The water will be pumped from the well direct into a water-tower by one set of three-throw plunger pumps to lift 4500 gallons an hour, working ten hours a day, which will raise 45,000 gallons a day; and the pumps are to be driven by a 6-horse power oil-engine. The engine and pumps will be in duplicate.

A New Water-Main for the Supply of Blackpool.—The works of the Fylde Water Company will this week pass into the hands of the Water Board of the Local Authorities. The knowledge of this gave additional interest to the recent opening of a 24-inch main from the Company's Barnacre reservoirs to Blackpool, as it reminds one of the praiseworthy and successful manner in which the Company in the past have striven to meet the demands of the Fylde watering-places. The new main will do away with any fears Blackpool residents, especially at the North Shore, may have had of insufficient water pressure, which, owing to the rapid growth of the town, had become a danger. This will easily be seen when it is stated that the two previous mains were only capable of supplying 3 million gallons a day; whereas the amount required for Blackpool alone in the season is now about 4 million gallons. The new main, however, is capable of supplying 8 million gallons a day. The total weight of the iron pipes and cylinders used was upwards of 13,000 tons.

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NEW SEASON'S LIST NOW READY.

Fatal Gas Explosion near Dudley.—An explosion of gas, which caused the death of two persons and severe injuries to six others, took place shortly before midnight last Thursday at Netherton, near Dudley. Early in the evening an escape of gas was detected at the Hope Tavern, kept by Mr. Richard Harrison, and the Gas Company's officials were communicated with. Two men attended, and, after an examination of the premises, declared, it is stated, that no danger need be apprehended. The gas had been turned off; but, in consequence of this assurance, it was again turned on and lighted. Nothing unusual occurred until about closing time, when some of the customers were leaving the house. Suddenly there was a terrible explosion in the bar, and the lower rooms of the house were wrecked. John Davenport (50) and his son James (18), miners, were found among the wreckage, dead, and the landlord, his wife, and four customers were very severely burned and required medical assistance. The cause of the explosion is supposed to be a fracture of the gas-main, for the neighbourhood has been much disturbed by mining operations. Moreover, a traction engine passed along the road early in the evening, and it is stated that a smell of gas was detected soon afterwards. The damage to the property, which belongs to local brewers, is fixed at £2000; and Mr. Harrison estimates his personal loss at £200. An inquest was opened on Friday by Mr. F. W. Ensor, the Deputy-Coroner; and, after evidence of identification had been taken, it was adjourned for a week.

Hastings Water Supply.—As far back as 1892, Alderman Elworthy, Chairman of the Water Committee of the Hastings Town Council, broached the idea of obtaining water from the Brede Valley, a few miles to the north-east of the town. The scheme was adopted; and, as the result of seven years' hard work on the part of the Borough Engineer (Mr. P. H. Palmer), ably seconded by Alderman Elworthy, the works have been so far completed as to allow of the water being used during the past fortnight. The cost of prospecting in connection with the project was about £20,000; and in addition to this the permanent works will entail an outlay of £110,000. The original scheme gave the estimated outlay as £140,000—an amount embracing considerably more work than it is now proposed to carry out. The yield of water is expected to be from 2½ to 3 million gallons per day; while the present consumption is about 1·1 million gallons. At present the water received in Hastings from the new source is flowing into the Halton reservoirs on account of the new reservoirs at Fairlight and Ore not being completed. It travels through six miles of 16-inch pumping main and 1½ miles of 10-inch gravitation main. The above-named reservoirs will each hold 1½ million gallons of the new water, which is soft and of excellent quality. On the completion of the new works, all the others will be done away with except the Filsham works, which are to be retained to supply the West Hill district of St. Leonards. The new source of supply, to which Alderman Elworthy has given a great deal of attention, is expected to meet the requirements of the borough for the next thirty years.

Sales of Shares.—At Newcastle last Tuesday, Mr. Turnbull sold by auction 550 ordinary shares of £5 each in the Chester-le-Street and Pelton Parish Lighting Company, Limited. The prices obtained ranged from £6 17s. 6d. to £7 2s. 6d. per share. The capital is required for extensions. The following prices were obtained for gas shares at a sale held last Thursday by Messrs. W. G. Stansfield and Co., at Bradford: Five shares in the Kildwick Parish Gas Company, £15 17s. 6d. each; £40 "B" stock in the Gildersome and Drighlington Gaslight Company, £59; £100 original 10 per cent. stock Airedale Gas Company, £227 10s.; £60 7 per cent. stock Calverley and Horsforth District Gas Company, £100; nine new shares (£4 paid) in the same Company, £8 2s. 6d. per share; and fifty shares East Ardsley Gas Company, 25s. Last Tuesday, Mr. W. E. R. Randall offered a number of gas and water shares for sale by auction at Chatham. Three £50 "A" shares in the Rochester, Chatham, and Strood Gas Company were disposed of for £126 10s. each; three "C" shares (7 per cent.), of £3 6s. 8d. each, were sold for £6 17s. 6d. per share; and three "D" shares (10 per cent.), of £8 10s. each, for £23 10s. per share. Two original £5 shares in the Brompton, Chatham, Gillingham, and Rochester Water Company were disposed of for £14 12s. each; seven similar shares realized £14 11s. per share; and 53 similar shares fetched £14 10s. apiece. Eighty-two £10 "B" shares in the Sheppey Gas Company were sold for £22 10s. per share; and sixty "C" shares of like nominal value for £15 each. Messrs. Craske and Sons lately disposed of some £20 "B" shares in the Colchester Gas Company at £35 5s. each; a few similar shares fetching £35 10s. apiece.

New Joint-Stock Companies.—The Acetylene Supply Company, Limited, has been registered with a capital of £1000, in £1 shares, to carry on the business of acetylene gas manufacturers. The Economic Oil Gas Syndicate, with a capital of £2000, in £1 shares, will carry on the business of oil-gas manufacturers.

East Stonehouse Water-Works.—It has been decided by the East Stonehouse District Council to sell the site of the reservoirs and the leat which were formerly used in connection with the water supply of the township. The reservoirs and leat have not been used for the past few years, owing to the fact that water is now supplied to Stonehouse from the reservoirs and mains of the Plymouth Corporation. The site of the Stonehouse reservoirs has been acquired by a Syndicate, who have purchased the surrounding land for building purposes.

The Purchase of the Torquay Watershed.—An inquiry was held at Torquay last Thursday respecting an application by the Town Council for the sanction of the Local Government Board to a loan of £20,000 for water-works purposes. The Town Clerk explained that under the Act empowering the Corporation to purchase the land comprising the watershed they were authorized to borrow £40,000. It had, however, been found that the land cost more than the estimate. For 1495 acres actually purchased they had to pay £36,922, while the land which they had provisionally agreed to purchase would cost £10,327; and it was estimated that the cost of 200 acres still remaining would be £4300. This made a total for the land of £51,549; and in addition there were costs to the extent of £3932, and compensation £3655 to be provided for; making a total of £59,136. It was suggested that the repayment of the loan should be spread over 60 years.

A Touching Incident.—The Central News says: "As the Queen was returning from her drive on Thursday, a painful incident was witnessed by Her Majesty at Newport (I.W.). An accident, which had afterwards a fatal result, had befallen a lad of about sixteen years, who, while engaged in some extension works of the Newport Gas Company, was run over by a steam-crane driven by his own brother, and received frightful injuries in the lower part of his body. The Queen happened to pass at the time of the sufferer's removal on a stretcher to the local ambulance waggon, for conveyance to the County Hospital, and through her attendants made kind inquiries as to his injuries. Her Majesty subsequently caused a telegram to be sent from Osborne to the hospital, notifying the coming of the patient, with a request that every attention should be paid him, and a wish to be informed of his condition. The poor lad died, however, soon after his arrival at the institution."

In connection with the Lincoln Health Exhibition, the Council of the Sanitary Inspectors' Association decided to award silver and bronze medals for the best two exhibits of manufactures suitable for work incidental to sanitary inspectors' duties, also five certificates of merit in addition. Messrs. Guest and Chrimes, of Rotherham, have been awarded a bronze medal for the "general excellence" of their exhibit.

At an exhibition of domestic appliances now being held in the Albert Hall, Sheffield, the whole of the platform is occupied for show purposes by Messrs. John Wright and Co., Limited, who are working in connection with the Sheffield Gas Company. They make a special display of their "Eureka" gas-cooker of the latest model; also of Sutherland's patent penny-in-the-slot gas-meters, and "Czarina" and "Queen" gas-fires, in addition to the large assortment of boiling and grilling appliances.

As may have been noticed by our advertisement columns, instructions have been given by the Directors of the Swansea Gas Company to Messrs. John M. Leeder and Son to offer for sale, on the 5th prox., at the Royal Hotel, Swansea, £20,000 of new ordinary stock, entitled to 5 per cent. per annum dividend, and £6000 of 3½ per cent. perpetual debenture stock, 1898, of the Swansea Gaslight Company. The new capital, which will be issued in £100 lots, is required for general extensions, and to provide for the increase in the coin-meter system. In the twelve months ending June 30, the consumers by the latter system increased by 2006, as compared with 225 of the ordinary class; while the additional consumers of this class using cooking-stoves were 310, against 947 on the prepayment system. The ordinary stock sold about this time last year fetched an average of £123 12s. 4d. per £100, which would return the purchaser about £4 1s. per cent. The premiums received on former sales of the Company's capital have amounted to £43,658, which has been invested in the works; and the Company have a reserve fund amounting to £15,131.

NOTICE TO ADVERTISERS.—COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office *not later* than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or Stoppages of, PERMANENT ADVERTISEMENTS should be received not later than the FIRST POST on SATURDAY.

GAS PURIFICATION AND CHEMICAL COMPANY, LIMITED.

OXIDE OF IRON.

O'NEILL'S Oxide has a larger annual sale than all other Oxides combined. Purity and uniformity of quality guaranteed.

JOHN WM. O'NEILL, Managing Director,
160, 161, & 162, PALMERSTON BUILDINGS,
OLD BROAD STREET,
LONDON, E.C.

ANDREW STEPHENSON, AGENT. All communications re Oxide to the Company as above.

WINKLEMANN'S ORIGINAL "VOLCANIC" FIRE CEMENT and "VOLCUM" PASTE. Always ready for use in GAS-WORKS. Resists 4500° Fahr.

ANDREW STEPHENSON,
162, Palmerston Buildings,
Old Broad Street, E.C.
"Volcanism, London."

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM; and 45 & 47, Westminster Bridge Road, LONDON, S.E.
First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.
Telegraphic Addresses:
"Braddock, Oldham." "Metrique, London."

SULPHURIC ACID.

JOHN NICHOLSON & SONS, Limited, Chemical Works, Leeds, specially produce this ACID from SULPHUR, for making SULPHATE OF AMMONIA of high quality and *good* colour. Delivery in our own Railway Tank-Wagons or Carboys. Highest references and all particulars supplied on application.

MELROSE CYCLES

SHOULD be bought by Gas and Water Officials. Ladies' No. 1, £10 10s.; No. 2, £8 10s. Gents' No. 1, £10; No. 2, £8. Highest Quality. Twelve Months' Guaranty. Sent on approval. Catalogue free. MELROSE CYCLE COMPANY, COVENTRY.

SEASON 1899.

BALE'S OXIDE OF IRON, of finest Quality. Summer delivery specially recommended for efficiency and economy.
FIRE CEMENT, PAINT, and CHEMICALS.
120 and 121, NEWGATE STREET, LONDON, E.C.

SADLER & CO., Ltd., Middlesbrough, Tar Distillers and Tar Colour Manufacturers. BENZOL specially prepared for Gas Enrichment free from Sulphur. Pure Hydrated OXIDE OF IRON for Purifying Gas either for Sale or Lent on Hire. Always Buyers of GAS TAR and AMMONIACAL LIQUOR.

CANNEL, COAL, ETC.

JOHN ROMANS & SON, EDINBURGH, Gas Engineers, supply all the most approved SCOTTISH CANNELS; also FIRE-CLAY GOODS, CAST-IRON PIPES, and other APPARATUS for GAS and WATER WORKS.
Prices, &c., will be forwarded on application to No. 80, ST. ANDREW SQUARE, EDINBURGH, NEWTON GRANGE, NEWBATTLE, DALKEITH, } SCOTLAND.

BROTHERTON & CO.
Offices: Commercial Buildings, LEEDS.
Correspondence invited.

PORTER & CO., Gowts Bridge Works, LINCOLN, Engineers, Ironfounders, and Contractors for the erection of Gas-Works for Towns, Villages, Mansions, Manufactories, Collieries, and Isolated Buildings at home and abroad. Manufacturers of Retorts and Fittings, Condensers, Scrubbers, Purifiers, Valves, &c.; also of Girders, Wrought and Cast Iron Tanks, Iron Roofs, &c.
Telegraphic Address: "PORTER LINCOLN."
[For Illustrated Advertisement, see Aug. 1, p. 332.]

AMMONIACAL LIQUOR wanted.
BROTHERTON AND CO., Ammonia Distillers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

HYDRATED OXIDE OF IRON.
PREPARED from Pure Iron.
Twice as Rich as Bog Ore.
Gives no Back Pressure.
The Cheapest in the Market.
Can be Lent on Hire.
Can be Exchanged for Spent Oxide.
READ HOLLIDAY AND SONS, LTD., HUDDERSFIELD.

SPENT OXIDE wanted.
BROTHERTON AND CO., Chemical Manufacturers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

SULPHATE OF AMMONIA SATURATORS.
JOSEPH TAYLOR & CO., Chemical Plumbers, &c., and Makers of every description of Solid Plate Lead and Timber Cased Saturators, &c., CENTRAL PLUMBING WORKS, TOWN HALL SQUARE, BOLTON. Special attention to Repairs.
Before placing Orders, please write for Estimate.
Telegraphic Address: "SATURATORS, BOLTON."

SPECIAL PAINT FOR GAS-WORKS.
JOHN E. WILLIAMS AND CO.
VICTORIA PAINT WORKS,
MANCHESTER.
Telegrams: "ENAMEL." National Telephone 1769.

JOHN RILEY & SONS, Chemical Manufacturers, Hapton, near Accrington, are MAKERS of SULPHURIC ACID, from Brimstone, for Sulphate of Ammonia Making. Highest percentage of Sulphate of Ammonia obtained from the use of this Vitriol. References given to Gas Companies.

SULPHURIC ACID for Sale.
BROTHERTON AND CO., Chemical Manufacturers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

BENZOL, specially made for the Enrichment of Gas.
ELLISON AND MITCHELL, LIMITED, Kilnhurst, near ROTHERHAM.

GAS CARBON Wanted, not less than 4-Ton Loads.
Apply to the BRIMINGTON CARBON COMPANY, Sowerby Bridge, YORKS.

PRACTICAL RETORT SETTER.
GEORGE NUTTALL, 32, Havelock Road, Saltley, Birmingham.
Regenerator or other Furnaces erected to Engineers' own Designs. Best Work Guaranteed. Please write for Estimates.

GAS TAR wanted.
BROTHERTON AND CO., Tar Distillers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

SHEFFIELD CHEMICAL COMPANY, LIMITED.
BUYERS of Spent Oxide. Sellers of OXIDE OF IRON and SULPHURIC ACID.

PATENTS FOR INVENTIONS.
Messrs. J. C. CHAPMAN & CO., Chartered Patent Agents, ADVISE ON ALL MATTERS CONNECTED WITH ABOVE.
Information and Handbook on application.
70, CHANCERY LANE, LONDON, W.C.

IRON OXIDE (Bog Ore), best quality, for the Purification of Gas, containing up to 85 per cent. Hydrated Oxide of Iron, and absorbing while being used a high percentage of Blue.
S. BOWLEY AND SON, Wellington Works, Battersea Bridge, LONDON, S.W.

WANTED, a Situation by a good all-round GAS-FITTER. Highest Reference.
Address "GAS," 47, Sycamore Road, Handsworth, BIRMINGHAM.

WANTED a re-engagement as Engineer and MANAGER of a Gas-Works. Make 100 to 700 Millions per annum. Highest References. Age 40. Married.
Address No. 3327, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

ADVERTISER, well known in the Gas World, seeks an appointment as OUTDOOR SUPERINTENDENT or TRAVELLER. Age 40. Married. Best References.
Address No. 3328, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, an Engagement by the Advertiser, a GAS MANAGER, with extensive Home and Colonial experience, who will be disengaged in the early part of the month of October. Well up in all the details of modern Gas-Works Construction and its Management, and the most approved Appliances introduced to economize the production of Gas and extend its use. Practically acquainted with both American and German Carburetted Water-Gas Plant and its manipulation. A good Draughtsman and Accountant. Satisfactory References and Testimonials.
Address No. 3333, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

LEADING Stoker wanted, competent to work Engines and Exhausters. Wages 28s.
Apply, with *copies* of Testimonials and state Age, to J. H. TROUGHTON, Gas-Works, NEWMARKET.

WANTED, two good reliable Men as UNDER STOKERS, and to light and put out Lamps.
Apply to the MANAGER, Gas-Works, ANDOVER.

WANTED, for a small Gas-Works, a steady young Man as STOKER, and to make himself generally useful. Used to Engine and Exhauster.
Apply to the MANAGER, Gas Company, Knighton, RADNORSHIRE.

WANTED, a Draughtsman, accustomed to Retort Settings and Gas-Works Plant generally.
Apply, stating Experience, Age, and Salary expected to the LEEDS FIRE-CLAY COMPANY, LIMITED, Engineering Department, Wortley, near LEEDS.

ROTHERHAM CORPORATION.
(GAS DEPARTMENT.)

WANTED, One or Two First-class GAS-FITTERS.
Send Particulars, and state Wages required, to FRANK A. WINSTANLEY, Engineer and Manager.

WANTED, a thorough good steady Man as LEADING STOKER, used to Scoop Work, Engines and Exhausters, &c. Night and Day Shifts. Able to control Men. Wages 38s. per week, and one Week's Holiday in Summer. None but good Men need apply.
MANAGER, Gas-Works, STAINES.

CANTERBURY GAS AND WATER COMPANY.

WANTED, at once, a steady, reliable Man as MAIN and SERVICE LAYER and GAS and WATER FITTER. Good Wages to a competent person.
Applications, stating Wages required, with *copies* of recent Testimonials as to Character and Ability, to be delivered at the Company's Offices, on or before the 2nd of September next.

By order,
JAMES BURCH,
Secretary.

39, Castle Street, Canterbury,
Aug. 21, 1899.

THE GASLIGHT AND COKE COMPANY.

WANTED, at the Beckton Station of the above-named Company, an ASSISTANT ENGINEER having the following qualifications—viz., Three Years' Professional training as Pupil, Two Years' service as Gas Engineer's Assistant, with a general knowledge of the routine of a Gas-Works and a fair knowledge of mechanical draughtsmanship.
He will be required to live on the Works, where a Residence, with Gas and Fuel, is provided.
Commencing Salary according to qualifications, rising by annual increases to £250 per annum.
Applications, with Particulars of Qualifications and References, to be made, by letter, to the undersigned not later than the 14th prox.

By order,
JOHN WILLIAM FIELD,
Secretary and General Manager.

Chief Office: Horseferry Road.
Westminster, S.W., Aug. 14, 1899.

FOR SALE—The English Patent for AIR-GAS APPARATUS of most ingenious construction.
For Particulars, address H. A., 1652, care of RUDOLF MOSSE, HAMBURG.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
J. F. BLAKELEY, Gas Engineer, Thornhill, DEWSBURY.

FOR SALE, cheap to clear—
TOWER SCRUBBER (Walker), 5 ft. by 25 ft. high, complete.
STATION METER, 8-inch, complete and perfect.
EXHAUSTER and ENGINE, combined (Waller), 9-inch Valves, Governors, &c., complete.
GASHOLDER, 35 ft. by 14 ft. deep, only Six Years old.
CAST-IRON TANK, 31 ft. dia., 12 ft. deep, nearly new.
Four 10-feet PURIFIERS, Centre-Valve and Connections.
EXHAUSTERS, sizes from 4000 to 30,000 Cubic Feet per hour in stock.
J. FIRTH BLAKELEY & Co., Gas Engineers, Thornhill, DEWSBURY.

BOROUGH OF WIDNES.

THE Corporation invite Tenders for the purchase of about 1000 Tons of GAS TAR from their Gas-Works for the Twelve Months ending the 30th of September, 1900.
Forms of Tender and Conditions of Contract may be obtained from Mr. Isaac Carr, M.Inst.C.E., Gas-Works, Widnes.
Tenders, endorsed "Tar," to be delivered to the undersigned not later than the 4th prox.
The highest or any Tender not necessarily accepted.

H. S. OPPENHEIM,
Town Clerk.

Town Hall, Widnes,
Aug. 24, 1899.

CITY OF LEEDS.
(GAS DEPARTMENT.)

TENDERS FOR BREEZE.

THE Gas Committee of the Leeds City Council are prepared to receive TENDERS for the purchase of the surplus BREEZE to be produced at the several Gas-Works for Twelve Months commencing Oct. 1 next.
Forms of Tender and further Particulars can be obtained on application to the undersigned.
Tenders, endorsed "Breeze," and addressed to the Chairman of the Gas Committee, Municipal Buildings, Leeds, will be received not later than Tuesday, Sept. 26.
The Committee do not bind themselves to accept the highest or any Tender.

R. H. TOWNSLEY,
General Manager.

Municipal Buildings, Leeds,
Aug. 26, 1899.

CLACTON URBAN DISTRICT COUNCIL.
(GAS AND WATER DEPARTMENT.)

TENDERS FOR MAINS.

THE above Council invite Tenders for supplying and laying about 520 Yards of 3-inch GAS and WATER MAINS.
Specification and full Particulars may be obtained on application to the Engineer, Mr. Sidney Francis, Gas and Water Offices, Rosemary Road, Clacton-on-Sea.
Tenders, endorsed "Mainlaying," must be delivered to the undersigned not later than Wednesday, Sept. 6, at Four o'clock p.m.
The Council do not bind themselves to accept the lowest or any Tender.

GEO. T. LEWIS,
Clerk.

Town Hall Buildings,
Clacton-on-Sea, Aug. 26, 1899.

CORPORATION OF LEICESTER.

SULPHURIC ACID.

THE Gas and Electric Lighting Committee of the above Corporation are prepared to receive TENDERS for the supply of SULPHURIC ACID, made from either native Sicilian Brimstone, recovered Sulphur, or Pyrites. Specific Gravity in each case to be stated. The price to include free delivery by rail into elevated Tanks, 27 feet high, at the Chemical Works, Aylestone Road.
Probable quantity about 1700 Tons, to be delivered as required during the ensuing Twelve Months.
Tenders, addressed to Alderman Lennard, J.P., Chairman, and endorsed "Tender for Acid," to be delivered at these Offices not later than Eleven o'clock a.m., on Saturday, Sept. 9 next.
The Committee do not bind themselves to accept the lowest or any Tender.

ALFRED COLSON, M.INST.C.E.,
Engineer and Manager.

Offices: Millstone Lane,
Leicester, Aug. 26, 1899.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his AUCTIONS of STOCKS and SHARES in London, Suburban, and Provincial Gas and Water Companies are held MONTHLY, at the Mart, Tokenhouse Yard, E.C.
He also undertakes the issuing by Auction of Gas and Water Stocks and Shares under Parliamentary Powers.
Terms for issuing such Capital, and also for including Gas and Water Stocks and Shares in these periodical Sales, can be obtained on application at Mr. Alfred Richards's Offices, 18, FINSBURY CIRCUS, E.C.

TO CAPITALISTS AND OTHERS.

SWANSEA, GLAMORGANSHIRE.

JOHN M. LEEDER AND SON have received instructions from the Directors of the Swansea Gaslight Company to offer for SALE BY PUBLIC AUCTION, at the Royal Hotel, High Street, Swansea, on Tuesday, Sept. 5, 1899, at Half-Past Two for Three o'clock precisely in the afternoon, in 310 lots

£20,000
NEW ORDINARY STOCK, and
£6000
THREE-AND-A-HALF PER CENT. PERPETUAL DEBENTURE STOCK
OF THE
SWANSEA GASLIGHT COMPANY;

being part of the additional Capital of the Company authorized to be raised by the Swansea Gas Act, 1898, and pursuant to the provisions and conditions therein contained.
Purchasers of the New Ordinary Stock, 1898, will be entitled to three months' interest at 5 per cent. per annum as from the 1st of October, 1899, payable on the 6th of April, 1900; and purchasers of 3½ per cent. Perpetual Debenture Stock, 1898, to three months' interest due and payable on the 1st of January, 1900.
Particulars, with Conditions of Sale, containing all necessary Information, may be obtained on application to the SECRETARY and MANAGER of the Swansea Gaslight Company, Oystermouth Road, SWANSEA; or to the AUCTIONEERS at their Offices, 46, Waterloo Street, SWANSEA.

PATENTS, DESIGNS, AND TRADE MARKS ACTS, 1883 TO 1888.

NOTICE is Hereby Given, that Sardi's Patent Gas Generator Syndicate, Limited, of 68, Finsbury Pavement, in the City of London, have APPLIED FOR LEAVE TO AMEND THE SPECIFICATION OF LETTERS PATENT No. 20,903 of 1896, granted to Vincenzo Sardi, for "Improvements in Apparatus for the Manufacture of Acetylene Gas."

Particulars of the proposed Amendments were set forth in the "Illustrated Official Journal (Patents)" issued on the 23rd of August, 1899.

Any person, or persons, may give Notice of Opposition to the Amendment (on Form G), at the Patent Office, 25, Southampton Buildings, London, W.C., within One Calendar Month from the date of the said "Journal."

C. N. DALTON,
Comptroller-General.

H. GARDNER,
Patent Agent,
166, Fleet Street, London,
Agent for Sardi's Patent Gas Generator Syndicate, Limited.

RAILWAY AND CANAL TRAFFIC ACT, 1888.

PROPOSED AMENDMENT OF CLASSIFICATION.

NOTICE is Hereby Given, that, pursuant to the Railway and Canal Traffic Act, 1888, the various Railway Companies of Great Britain and Ireland, represented by the undersigned, have applied to the Board of Trade to amend the Classification of Merchandise Traffic and Schedule of Maximum Rates and Charges applicable thereto charged by such Railway Companies by adding to Class 5 of the said Classification the undermentioned articles, matters, or things—viz.,

INCANDESCENT MANTLES.

Anyone wishing to raise any objection to the proposed amendment may forward by post a notice of objection addressed to the Assistant Secretary, Railway Department, Board of Trade, Whitehall, London, S.W.

Notices of objection must be transmitted to the Board of Trade so as to reach there on or before the expiration of 21 days from the First day of September, 1899, and every objector must at the same time transmit a copy of his notice of objection to the undersigned as below.

H. SMART.

Dated the 29th day of August, 1899.

NOTE.—*Copies of objection must be forwarded to*

H. SMART,
Railway Clearing House,
Seymour Street, London, N.W.

Crown 4to., Price 3s. 6d.

GASHOLDER AND TANK

(Of One Million Cubic Feet Capacity)

AT THE

SUTTON GAS-WORKS.

Designed and carried out by

F. SOUTHWELL CRIPPS, Assoc.M.Inst.C.E.

MEMBER OF THE INSTITUTION OF GAS ENGINEERS,
MEMBER OF THE SOCIETY OF ARTS,
CONSULTING ENGINEER.

EMBRACING NOTES ON GASHOLDER CONSTRUCTION GENERALLY.

REPRINT OF A SERIES OF ARTICLES IN THE "JOURNAL OF GAS LIGHTING," &C., WITH THE ACCOMPANYING PLATES.

PUBLISHED BY
WALTER KING, 11, Bolt Court, FLEET STREET, E.C.

UNEQUALLED.

Gas Companies are solicited to try Samples of the

MIRFIELD

BLACK BED GAS COAL.

Prices and Analysis on application.

MIRFIELD (GAS-COAL) COLLIERY COMPY.
RAVENSTHORPE, NEAR DEWSBURY.

NITRATE of Thorium and Cerium.
FABRIK CHEMISCHER PRAEPARATE VON STHAMER, NOACK, AND CO., HAMBURG.

ENRICH YOUR GAS
WITH CHEAP
BENZOL
SPECIALLY PREPARED, FREE FROM SULPHUR.

AT to-day's Price of Benzol, Illuminating POWER costs less than ONE-THIRD OF A PENNY PER CANDLE.

Apply to SADLER & CO., MIDDLESBROUGH.

NEWBATTLE CANNEL.

Highest Results in Gas, & Excellent Coke.

QUOTATIONS ON APPLICATION TO

THE LOTHIAN COAL COMPANY,
LIMITED,
NEWBATTLE COLLIERIES,
DALKEITH N.B.

JAMES OAKES & CO.

ALFRETON IRON-WORKS, DERBYSHIRE,
AND
Wenlock Iron Wharf, 21 & 22, Wharf Road, CITY ROAD, LONDON, N.,

Manufacture and keep in Stock at their Works (also large stock in London)

PIPES and CONNECTIONS, 1½ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.

NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with Bolts, Nuts and Covers, and rendering Leakage impossible.

HOLMSIDE

GAS COALS.

Present Daily Produce over 5000 Tons.

Latest Analysis—By CHARLES PHILLIPS, Gas Examiner to Rotherham Corporation

Yield of Gas per Ton . . .	11,205 Cubic Feet.
Illuminating Power	16 7/10 Stand. Sperm. Candl.
Coke (of good & pure quality)	13¾ Cwt. per Ton.
Sulphur	A little over 1 per Cent.
Ash	Under 1 per Cent.
Tar	163 lbs. (Avoir.) per Ton.
Ammoniacal Liquor	103 lbs. (Avoir.) per Ton.

HOLMSIDE GAS COALS are supplied to the largest Gas Companies in England and on the European Continent; London alone consuming about half the produce.

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PELTON GAS COALS.

Present Daily Produce available 3000 Tons.

Of equal quality to the "Holmside" Coal, and also very largely used by many Gas Companies at Home and Abroad.

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HOLMSIDE & SOUTH MOOR OFFICES,
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FITTED WITH STEEL ENAMELLED WHITE REFLECTOR.

This Favourite Lamp has been largely adopted by many Corporations and Lighting Authorities.

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BOGHEAD CANNEL.

Yield of Gas per ton	13,155 cub. ft.
Illuminating Power	38·22 candles
Coke per ton	1,301·88 lbs.

EAST PONTOP GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	17·8 candles.
Coke	70 per cent.

SOUTH PELAW MAIN GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	16·3 candles.
Coke	73·1 per cent.

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COAL OWNERS, NEWCASTLE-ON-TYNE;
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ANALYSIS.

Yield of Gas per Ton.	10,500	Cubic Feet.
Illuminating Power	16·9	Candles.
Coke	66·7	Coke.
Sulphur	0·86	Sulphur.
Ash	2·04	Ash.

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Yield of Gas per Ton	10,500 Cub. Ft.
Illuminating Power	16·9 Candles.
Coke (of good quality)	67·5 per Cent.
Sulphur	0·58 ,,
Ash	2·73 ,,

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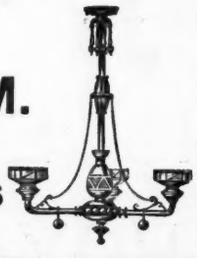

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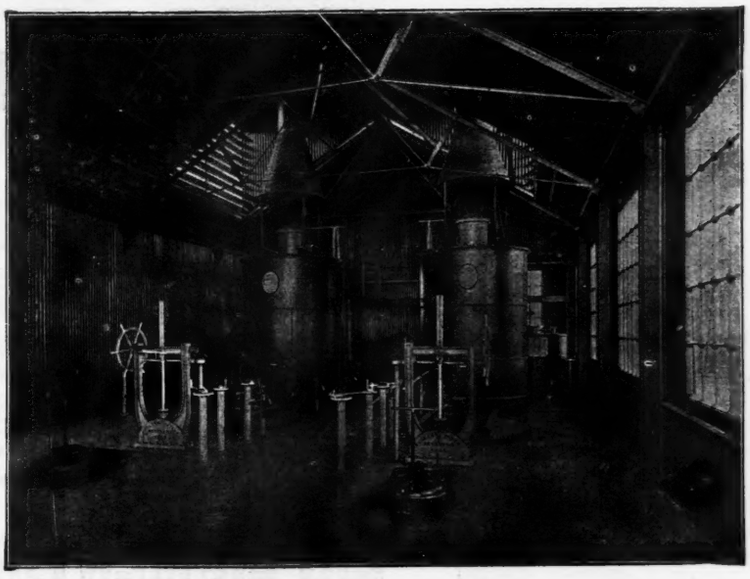
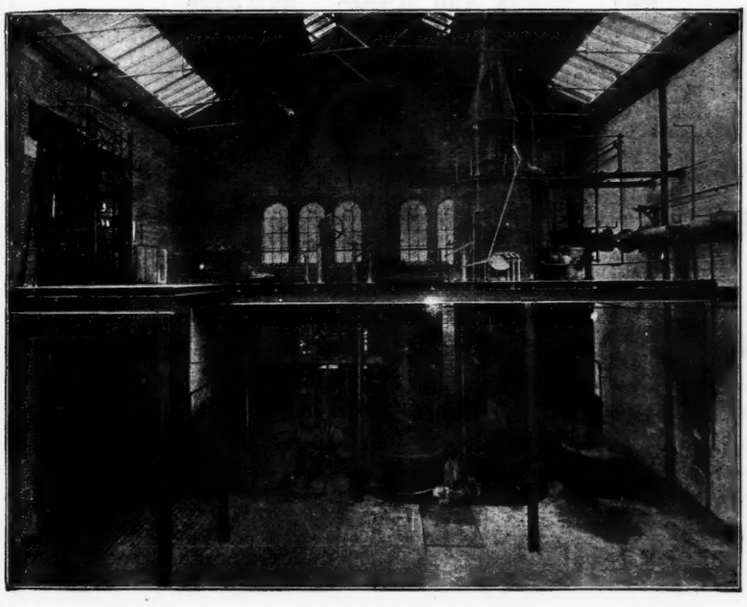


Water-Gas Plant at Southall.



Water-Gas Plant at Folkestone.

Carburetted Water-Gas Installations.

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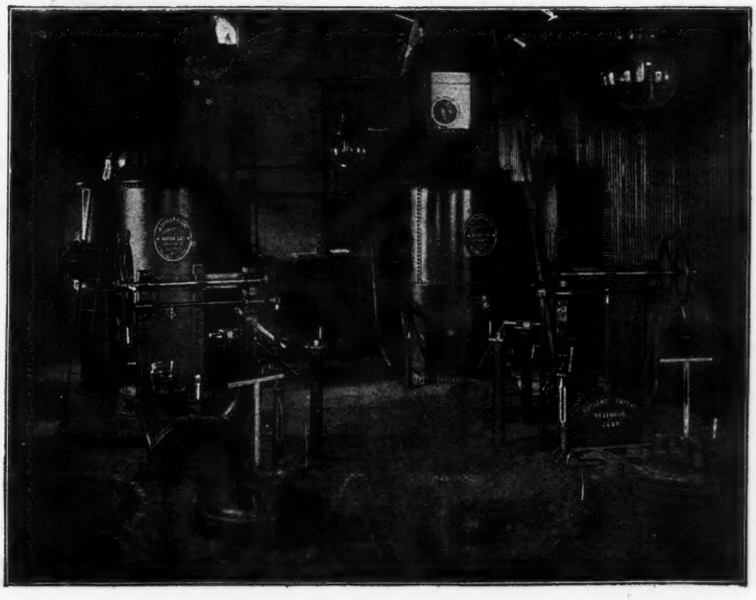

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TESTIMONIAL

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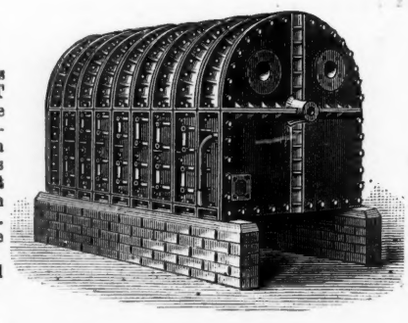
Dover, Feb. 8, 1899.

H. KIRKHAM, Esq.

Dear Sir,—Have now made further tests with the Washer fitted with your PATENT WASHING DEVICES, and have much pleasure in reporting that *the results were highly satisfactory*; also, I ascertained that the maximum results were obtained when the machine was working at three revolutions per minute. At this speed 13 to 14 gallons of water per ton of coal carbonized were converted into 10-oz. Ammoniacal Liquor, and at same time the Gas was free from Ammonia.

Should you wish further details, I will forward them.

I am, dear Sir, yours truly,
RAPHAEL HERRING, Engineer.



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The Scrubbing Devices are metal scrolls fixed in cages of segmental form, which can be readily and successively removed from the wheels through a manhole on the top or side of the machine, and the enclosed Scrubbing Devices taken out, cleaned, and replaced without the delay that necessarily takes place when the entire scrubbing material of the whole wheel has to be dealt with in one operation—thus effecting an important saving in time and labour. These Cages can be applied to the wheels of any machines of the type shown, and will increase their efficiency above 20 per cent.

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'SUNLIGHT' TINTED MANTLES.
Strongest and Pleasantest Colour.

} These are INTERCHANGEABLE on same Burner.

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Cheapest in the Market.

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Cheapest, Simplest, and Most Efficient.

SELF-LIGHTER.
Only Efficient System.

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An early visit to the London Show-Rooms is especially solicited.

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Sunlight Tinted Mantles have been declared by the Courts to be "as far asunder as the Poles" from the Welsbach System, and we guarantee that our

SUNLIGHT WHITE MANTLES

are NO Infringement of that or any other Patent, and are made under a Series of Independent Patents, and by an entirely New Process.

We give with every Mantle sold an absolute indemnity to both seller and user against all molestation on this account.

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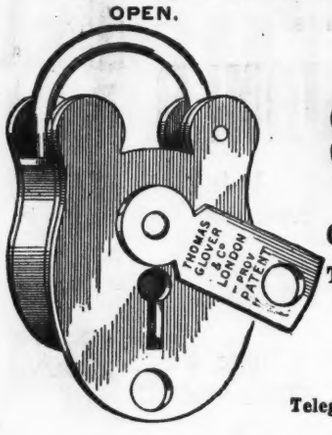

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PREVENTS TAMPERING WITH THE

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The Padlock is Sealed by means of a Lead Eyelet, which is impressed with Company's private mark. Eyelets easily fixed and removed by Company's Collector.

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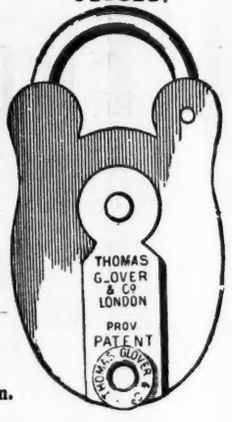

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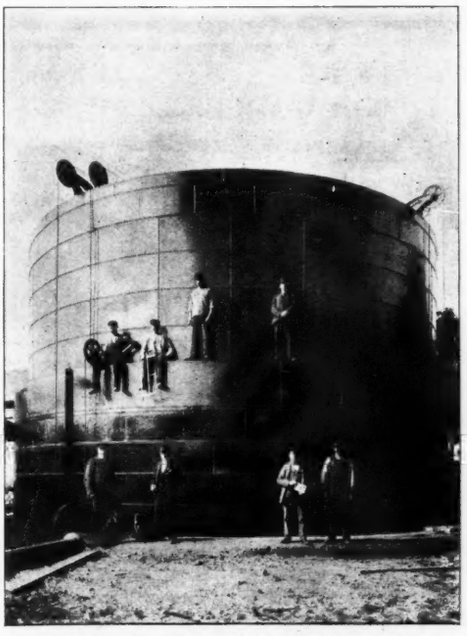

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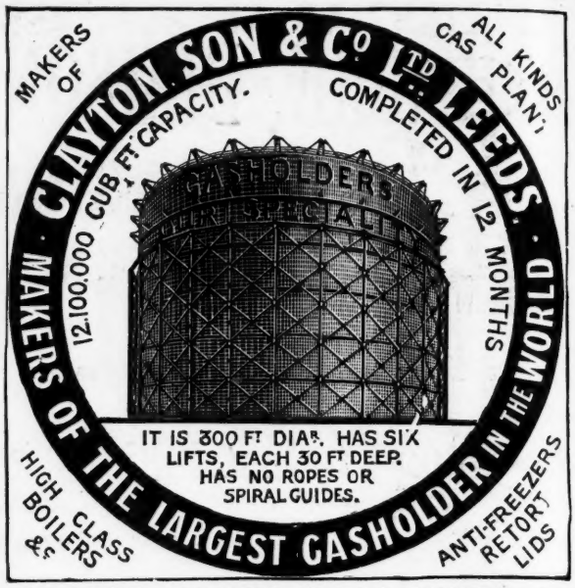
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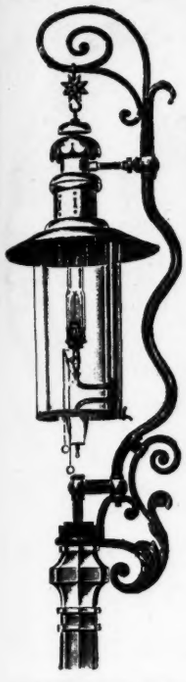

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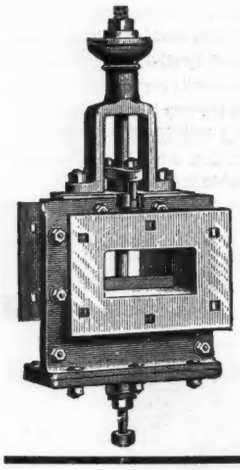

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